

U.S. CIRCUIT CT. DIST. OF CONN.  
National Phonograph Co. vs.  
American Graphophone Co. In  
Equity no. 1076 & no. 1103  
BRIEF FOR COMPLAINANT



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# United States Circuit Court.

DISTRICT OF CONNECTICUT.

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NATIONAL PHONOGRAPH COMPANY,  
*Complainant,*

*vs.*

AMERICAN GRAPHOPHONE COMPANY,  
*Defendant.*

In Equity.

No. 1076.

On Patent 667,662.

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NATIONAL PHONOGRAPH COMPANY,  
*Complainant,*

*vs.*

AMERICAN GRAPHOPHONE COMPANY,  
*Defendant.*

In Equity.

No. 1103.

On Patent 713,209.

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## BRIEF FOR COMPLAINANT.

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# United States Circuit Court,

DISTRICT OF CONNECTICUT.

NATIONAL PHONOGRAPH COMPANY

vs.

AMERICAN GRAPHOPHONE COMPANY.

In Equity, No.  
1076. On Pat-  
ent 667,662.

NATIONAL PHONOGRAPH COMPANY

vs.

AMERICAN GRAPHOPHONE COMPANY.

In Equity, No.  
1103. On Pat-  
ent 713,209.

## BRIEF FOR COMPLAINANT.

The two patents in suit relate to processes for duplicating phonograph records, such patents being owned by the complainant and asserted to be infringed by the defendant. The patent in suit in case 1076 (No. 667,662), although granted earlier, is based upon an application filed somewhat more than two years after the application for the patent in suit in case 1103 (No. 713,209). The patent of later date and earlier application is the broader patent, the two patents bearing the relation to each other of *genus* and *species*. The facts constituting the alleged infringement are the same in both cases, the single process used by the defendant in the manufacture of duplicate phonograph



records being asserted to infringe both patents. While case 1076 was in its preliminary stages, the broader patent (No. 713,209) was issued and suit 1103 was brought. Complainant's counsel proposed the consolidation of the two records at an early stage in the proceedings, but this did not meet the views of defendant's counsel at the time, with the result that two records have been made up which include the same fact depositions. Many of the issues (indeed, the most important ones) are the same in both cases, and the two patents in suit are closely related; so that the labors of the Court and of counsel will be simplified if the cases are considered together. It is the plan of this brief to discuss the two cases jointly so far as may be, and separately so far as is necessary, to secure simplicity of treatment and avoidance of repetition.

#### THE ART OF DUPLICATING PHONOGRAPH RECORDS.

Phonograph records<sup>1</sup> are the small hollow cylindrical objects carrying on their outer surfaces the minute indentations corresponding with the sound waves, with which we have been made familiar by the wide introduction of the phonograph. At the present time these records, as supplied to the public, are all "duplicates," although formerly many "original" records were made and sold. An "original" phonograph record is one which is produced by recording the sound waves directly upon the cylindrical surface of a phonograph blank, the blank being mounted in a phonograph

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<sup>1</sup> The "record" is more properly the series of minute indentations carried by the surface of the cylinder which are formed or *recorded* by the recording point or stylus as it is moved by the sound waves. The word "record," however, is used in the trade as meaning the entire cylindrical object with the sound indentations upon it as distinguished from the phonograph "blank" which is a cylinder with its surface prepared to receive, but not yet bearing, the sound waves or indentations.



and being rotated under a minute cutting tool (the recording point) which is moved radially with respect to the blank by a diaphragm against which the sound waves are projected, the recorder (point and diaphragm) being fed axially with respect to the blank like the tool in a screw-cutting lathe, so that it traces a spiral line upon the surface of the blank. This spiral line varies in depth and form with the radial movements of the recording point, thus producing a copy or record of the sound waves in the surface of the material of which the blank is composed. To *reproduce* the sound, the record, placed on the same or another phonograph, is traced by a reproducing point which rubs over the spiral line without cutting the material, and this point is given in and out or radial movements by the sound indentations corresponding with the movements which the recording point had when the record was made. These movements being transmitted from the reproducing point to a diaphragm, the sound waves are reproduced. The phonograph blanks upon which original records are made have been for a number of years composed of wax-like material made of compositions of which metallic soap is the base. This material is often referred to simply as "wax." These soap compositions have been found to give superior results for the making of original phonograph records, and were introduced into the art by Mr. Edison.

The phonograph business has found its profitable development in the direction of the manufacture of amusement records principally in the line of instrumental and vocal music. This development of the business made necessary the introduction of some method by which original records could be duplicated in quantities so as to reduce the expense incident to the manufacture of original records. This demand was first met commercially by a process of transferring the sound indentations from an original record to a blank on the principle of the pantograph, the original record being used as a "master" to move a reproducing point which was connected mechanically with a recording point resting upon a blank cylinder, the



recording point cutting in the blank cylinder the sound indentations corresponding with those in the master record. This method is what is referred to in the record as "cutting" or "mechanical" duplication. In this way a single original record may be used as a master for the cutting of a number of duplicate records. These "cut" duplicates, although they were the only forms of commercial phonograph records for a number of years, were an inferior product, because in the first place it was necessary to make them on a relatively soft surface in order that they might be readily cut without producing too great a wear upon the original master record, and hence they themselves were capable of giving only a limited number of reproductions without showing the effect of wear; and in the second place, the original master records became deteriorated by use and the later duplicates cut from a master record were not as good in quality as the earlier duplicates cut from the same master.

It was recognized at an early period in the art that the ideal method of duplicating phonograph records would be one in which the sound indentations would be transferred in some way to a metallic mold from which duplicates could be molded without deterioration of the mold, enabling the securing of an unlimited number of duplicates of equally good quality from a single mold and at small expense, and also in a material harder than can be used for the manufacture of original records or of cut duplicates. Both the complainant and the defendant (the only large manufacturers of phonograph records in this country) have recently introduced molded duplicates made by processes of this character. The importance and merit of the accomplishment involved in this result will be seen from the fact that the cut duplicates, the imperfections of which limited their sale, have entirely disappeared from the market, and that the demand for the molded duplicates is at least 50,000 per day.

The processes of molding duplicate records which have been found successful and have been employed commercially, differ somewhat in detail but are funda-

mentally similar. They all start with a hollow cylindrical metallic mold having the sound record carried in relief on its bore. To produce this mold an original record is first made by means of the phonograph on a cylindrical soap blank. The surface of the record is then coated with an infinitesimally thin layer of conducting material. The article is then placed in a plating bath and a thin shell of copper is deposited upon the surface of the record, the thin coating of conducting material on the soap surface enabling this to be done. The original record is then removed from the copper shell in any suitable manner, and this shell is fitted into a heavier metallic shell or otherwise suitably backed up to give it strength. The copper deposit follows all the irregularities of the original record surface however minute, with the result that a negative or reverse copy of the original record surface is produced on the bore of the tubular mold. This bore is then lightly plated with a coating of gold or nickel, or this surface may be formed by coating the original wax record in the first instance with a layer of electrically vaporized metal. The gold or nickel surface preserves the smooth character of the mold, preventing oxidation and also preventing the surface from being attacked chemically by the materials used in forming duplicate records in the mold. Having a mold of this character, the duplicate record may be formed in the mold in either of the following ways:

1. A blank cylinder of a suitable material, such as a wax or hard soap composition or celluloid, is inserted in the mold, and after being softened by heat or otherwise is expanded outwardly against the surface of the bore of the mold by means of a tapering mandrel forced into the blank or by other suitable means.
2. A core is placed in the mold, and the space between the core and the bore of the mold is filled with a molten soap composition in such a way as to exclude air bubbles, and this composition



on cooling sets or hardens and takes an impression of the record on the bore of the mold.

3. The mold, properly protected on its outer surface, is dipped into a molten soap composition maintained just above the congealing point, the composition congealing on the relatively cool bore of the mold to the desired thickness and the mold being withdrawn from the bath before its temperature is raised to a point where the composition congealed on its bore will melt and run off.

These three processes have a generic similarity, in that the material which is to take the impression of the record is in a plastic condition at the time the impression is taken. These processes may be designated as the "expanding" or "pressing," the "casting" and the "dipping" processes. The two latter are similar, in that they deal with *molten* material which is "cast" on the surface of the mold, and they also involve the employment of a somewhat higher temperature than that employed in the expanding process if the same material is used.

Having secured the impression of the mold it then becomes necessary to separate the engaging surfaces of the mold and duplicate and to remove the duplicate from the mold without injury to its delicate surface. In doing this the three processes involve the same manipulations, viz., in all cases the mold and its enclosed duplicate are reduced in temperature to such an extent that there results a bodily diametric contraction of the duplicate sufficient to entirely clear the engaging surfaces of the duplicate and the mold and to permit the duplicate to be withdrawn from the mold by a direct longitudinal movement. That this diametric contraction can be secured and the duplicate withdrawn without injury to the delicate record surface from the longitudinal and circumferential contractions which accompany it, without the sticking of the material, even to an infinitesimal extent, upon the surface of the mold and without cracking the record or warping it

out of shape, is one of the remarkable discoveries in this art. Proper conditions, of course, have to be observed to secure this result. These and other details will be referred to later.

The three processes referred to are those which are in use commercially to-day. The defendant uses the casting process. The complainant at present uses the dipping process, having formerly employed the expanding process in its commercial manufacture. Both complainant and defendant make their duplicates of soap compositions, which have been found peculiarly suited to casting from a *molten* material. The expanding process is at present employed by the Lambert Company of Chicago, which expands a celluloid blank in the mold, this material not being adapted for casting.

#### HISTORY OF EDISON'S WORK.

In Mr. Edison's first United States patent on the phonograph, the application for which was filed in December, 1877, he suggested that the sound record might be stereotyped and multiple copies made from the stereotype expeditiously and cheaply by casting or by pressing. He suggested that this would be "valuable when musical compositions are required for numerous machines,"<sup>1</sup> thus anticipating the development of the phonograph business in the direction which it has taken in recent years. And in his British patent, of April, 1878, he describes and illustrates three methods of duplicating phonograph records, one being similar to the cutting duplicating process, another involving the casting of duplicates in split molds, and another involving the formation of the sound record in relief on a hardened metal roller and using this roller to impress the record on a roller of softer material.<sup>2</sup> But in 1878 the recording and reproducing instrumentalities of the phonograph had

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<sup>1</sup> C. R., 1076, p. 205 ; C. R., 1103, p. 274.

<sup>2</sup> C. R., 1076, p. 370 ; C. R., 1103, p. 412.



not been sufficiently perfected to warrant the duplication of phonograph records.<sup>1</sup> There was no demand for bad records, whether originals or duplicates. Mr. Edison, however, had in mind at this early day that the phonograph would be ultimately perfected sufficiently to make it "very desirable to have a method whereby duplicates could be made cheaply and perfectly, and [he] always continued working on the duplicating process and also the recording process to attain this end."<sup>2</sup>

Mr. Edison again returned to the subject in 1887, "using the vacuum process for coating the phonograph record with silver and gold and other metals, electroplating copper upon the conducting surface to form a matrix."<sup>3</sup> Mr. Edison had invented, in 1884, the vacuum process of plating (Patent No. 526,147, dated September 18, 1894),<sup>4</sup> and this process he applied in taking up his experiments in 1887 for securing the conducting surface on the non-conducting phonograph record which, in 1887, was made of beeswax, paraffin and similar waxes. Edison has always believed, and still believes, that a conducting coating secured in this way produces a more perfect mold than where the conducting surface is produced by rubbing plumbago on the record. Mr. Edison's assistant, at the beginning of this work, was a Mr. Schulze-Berge, a skillful investigator who had been an assistant of Helmholtz. Schulze-Berge made notes of his work, which are preserved in notebooks and cover a period from April 11, 1888 to January 21, 1891. Schulze-Berge's notes were made in the German language and a translation of them from February 11, 1890 to January 21, 1891, covering more particularly his work on duplicating processes as distinguished from the manufacture of the

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<sup>1</sup> C. R., 1076, fol. 604; C. R., 1103, fol. 876.

<sup>2</sup> C. R., 1076, fol. 605; C. R., 1103, fol. 877.

<sup>3</sup> C. R., 1076, fol. 548; C. R., 1103, fol. 820

<sup>4</sup> C. R., 1076, p. 356.

molds, appears in evidence.<sup>1</sup> The first part of the work consisted largely in perfecting the vacuum process as applied to the manufacture of phonograph record molds. This resulted in the taking of patent No. 484,582 dated October 18, 1892, the application for which was filed on January 5, 1888.<sup>2</sup> This patent, while primarily directed to the process of securing the matrix or mold, describes the manner in which Mr. Edison proposed to carry on a duplicating process with such molds. It says:

"This metal cylinder [the mold with the phonograph record in relief upon its bore] is then split longitudinally by a very thin saw into a number of parts — say, for illustration, three parts, which are suitably mounted upon levers so that a mold is formed which can be closed to receive the material to be molded and opened to permit of its being taken out. The duplicate phonograms are produced by means of this mold by pouring therein and preferably around a suitable core placed in the mold suitable substances, such as wax or wax-like material, resin or plaster-of-Paris, the material being preferably too hard to be satisfactorily indented by the phonograph, or the duplicate phonograms may be made by taking sheets of smooth material like wax paper or tinfoil, and pressing them upon the surface of the mold by a plunger or otherwise, the sheets being afterwards backed up by a wax, resin or cement. The latter way of making the duplicate phonograms is especially applicable to flat surface phonograms, although it may be used for phonograms with cylindrical surfaces."

The "latter way," which Mr. Edison thought "especially applicable to flat-surface phonograms," has no bearing upon the issues of the present case except as

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<sup>1</sup> C. R., 1076, p. 277, *et seq.*; C. R., 1103, p. 315, *et seq.*

<sup>2</sup> D. R., 1076, p. 191; C. R., 1103, p. 388.



indicating that Mr. Edison disclosed his entire mind on the subject of duplicating phonograph records at the date of the application for this patent, viz., January 5, 1888. The more significant fact is that at this date Mr. Edison described, evidently as the best way he knew of duplicating cylindrical records from these molds, a casting process consisting in pouring molten material into a split mold around a core and opening the mold to release the duplicate. It is now recognized by both parties to the present suit that a duplicate produced in a split mold would be impracticable, indeed, inoperative, for commercial purposes, because of the formation of fins or burs on the surface of the duplicate at the points where the sections of the mold come together. These fins or burs would destroy the utility of the record, because every time the reproducer passed over one of them it would produce a sharp sound which the witnesses have aptly described as a "knock". Further than this, it is established in the present case that a process of casting duplicate phonograph records by pouring molten material into a cold mold is impracticable on account of the formation of air bubbles which would produce a pitted surface on the duplicate. To successfully cast a duplicate in a mold, the material must be in a suitable condition, and one important thing to be observed is that it be *non-aerated* at the time it sets and takes the impression from the mold, and this can only be accomplished by introducing the material into the bottom of the mold so as to expel the air as it rises, or by maintaining the material in a heated condition after it is poured into the mold until the air bubbles are driven out and the material becomes quiescent. In testifying about these early experiments Mr. Edison says that he

"at first split the mold by a fine saw and then made duplicates by pouring in different materials and dipping the cold matrix in molten material to chill on the surface the material, afterwards removing the same by opening the molds."



Continuing he says :

"Afterwards in 1888 we abandoned split molds as we found that with certain materials we could take advantage of the difference in the expansion between the materials poured into the matrix and the matrix itself, so that by chilling the whole down, the rate of contraction of the record material being greater than that of the metallic matrix, we found that it receded from the mold to a sufficient distance to be able to pull the record out longitudinally without scratching the surface."<sup>1</sup>

The "certain materials" referred to by Mr. Edison he says, were mixtures of soaps and waxes,<sup>2</sup> evidently referring to his soap compositions which he developed for this purpose at about this time and covered by his patent No. 430,274 of June 17, 1890, application filed July 30, 1888.<sup>3</sup>

As appears by Schulze-Berge's translated notes, his work in duplicating from the molds he made was principally directed to the employment of molten material by means of variations of the casting and dipping operations. He appears to have introduced the molten material into the mold by pouring it in from the top and also by admitting it to the bottom of the mold with varying degrees of rapidity. His dipping experiments resulted in securing casts of thin shells only, which shells were subsequently backed up by paraffine cast into the space between the shell and a core placed centrally in the mold. In some of the dipping operations the thin shell which was formed by dipping was pressed outwardly against the surface of the mold to secure a sharper impression by means of hydraulic pressure. The witness Aylsworth describes a number of these experiments made by Schulze-Berge.<sup>4</sup> While

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<sup>1</sup> C. R., 1076, fols. 548-9; C. R. 1103, fols. 820-1.

<sup>2</sup> C. R. 1076, fol. 622; C. R. 1103, fol. 894.

<sup>3</sup> C. R. 1103, p. 378.

<sup>4</sup> C. R. 1076, p. 114; C. R. 1103, p. 182.



it appears that Schulze-Berge secured some duplicates from which a fairly satisfactory reproduction of the sound could be and was secured, it is evident from an examination of his notes that these results were secured by him only in isolated instances and that the work which he carried on for Mr. Edison was not successful in respect to establishing the conditions which would enable duplicates to be cast in a continuous mold from molten material and to be removed therefrom by diametric contraction without injury to the record surface, as a matter of commercial manufacture. His notes show that the contraction was not uniform; that the material adhered to the surface of the molds; that in contracting the duplicate warped out of shape; that the duplicate had a foggy surface or a dull surface; he notes air holes, "running out," deviation from parallelism, variations in shrinkage, cracking and splitting of the duplicate, scratchy surface, horizontal rings on duplicate, and numerous other difficulties and defects. Many of these difficulties with the casting process are referred to in Mr. Edison's deposition.<sup>1</sup>

Mr. Edison says that casting was the ideal method but there were enormous difficulties in the way. Some of these difficulties were eliminated by a marked improvement in the phonograph *recorder* made by Edison, whereby an improved original record and one better adapted for duplicating by molding processes was produced. This invention was the circular recorder covered by Mr. Edison's patent No. 430,278 of June 17, 1890, application filed April 10, 1889.<sup>2</sup> The record produced by this circular recorder was one of marked peculiarities. It consisted of a series of gouges, as shown in figure 9 of the patent No. 430,278, which were extremely shallow and were adapted to be tracked by a reproducing point in the form of a ball. The circular cutter or recording point had a diameter of .040 of an

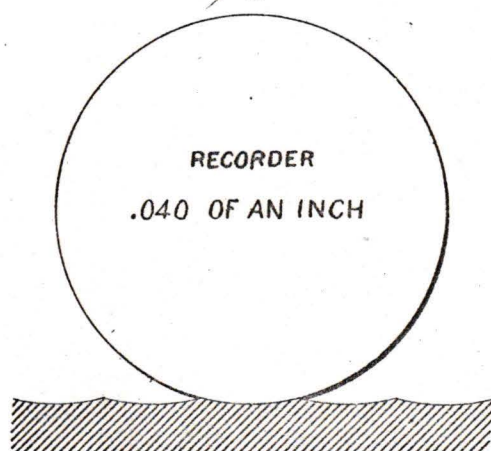
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<sup>1</sup> C. R., 1076, p. 150; C. R., 1103, p. 218.

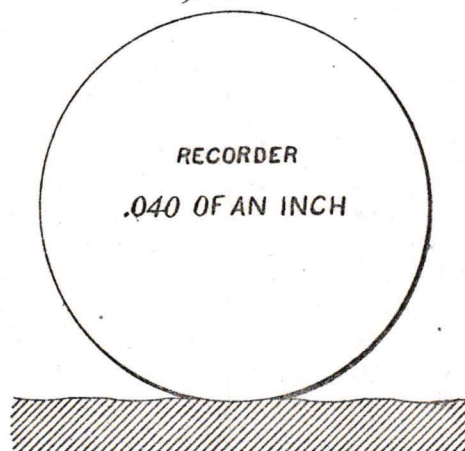
<sup>2</sup> C. R., 1076, p. 348; C. R., 1103, p. 382.

*Circular recorder and ball reproducer,  
enlarged fifty times.*

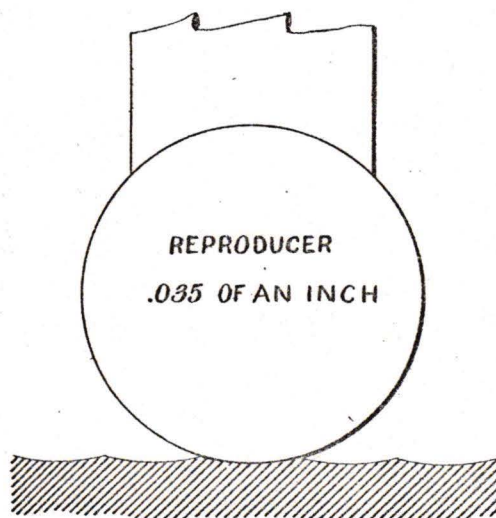
*Fig. 1*



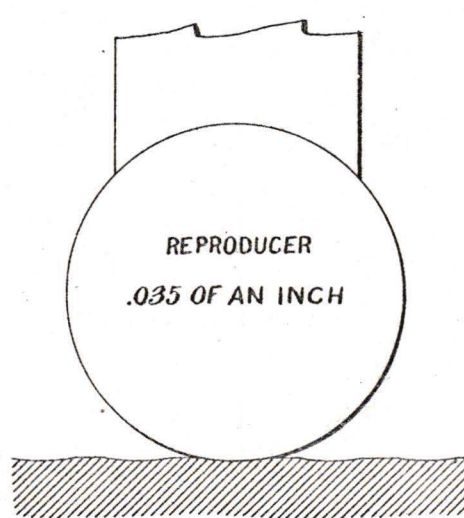
*Fig. 2*



*Fig. 3*



*Fig. 4*





inch, and since the maximum width permitted for each record groove is only .01 of an inch, the maximum depth of cut was somewhat less than .001 of an inch. The record was therefore made of a series of gouges which varied in width from a maximum of .01 of an inch to nothing and in depth from a maximum of somewhat less than .001 of an inch to nothing, and due to the fact that the diameter of the cutter was several times that of the maximum width of the cut, these record gouges curved downwardly at a very slight angle. This will be better appreciated by the sketches which appear on the opposite sheet, which show cross-sections through the record surface with the recorder and reproducer in elevation on a scale enlarged fifty times. Figure 1 shows the recorder making its cut of maximum depth; figure 2 shows the recorder making a cut of less depth; while figures 3 and 4 illustrate the reproducer engaging record gouges or indentations of the depth shown in figures 1 and 2 respectively. Mr. Edison says :

"There was evidently a disturbance of the record due to contraction when the square groove recording knife was used. In the latter end of 1888, August or September, somewhere around there, we got using a circular cutter and a reproducing ball. Then the troubles, as far as that was concerned, were enormously diminished, so that they didn't amount to much, although there is still a little of that left in our present methods—a little of the disturbance left in our present methods. With the round groove in the wax, the moment the wax left the mold it left it in all places, whereas with the square tool and groove it did not do so."<sup>1</sup>

In October, 1888, Mr. Edison filed in the Patent Office a caveat in which he suggested the process by which he was destined to first realize his hope of being

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<sup>1</sup> C. R., 1076, fol. 552; C. R., 1103, fol. 824.

able to form duplicates in continuous record molds and remove them therefrom without injury to the surface by diametric contraction.

In that caveat he says :

" For reproducing records, or rather duplicating the same, I coat the surface of the cylinder with, say, silver, by electro-vacuum process, then plate the outside  $\frac{1}{8}$  inch thick with copper, put the cylinder on a mandrel, true the outside by grinding to a taper, fit this in a taper steel die, then dissolve wax or other material out, and then put in a blank cylinder of plastic (when hot) material, force in a plunger, spread the same against the record, and then allow the same to cool. It will contract sufficient away from the record to allow of its being taken out."<sup>1</sup>

Regarding this caveat, Mr. Edison says :

" At the time I filed that caveat we were able to make very good matrices by the vacuum process and electrolytic process, and we also had the grooves cut by a circular recorder and had got onto a process by which we got very much better results than we did by the casting and the chilling process,"<sup>2</sup> i. e., the expanding process of the caveat.

Schultz-Berge left Mr. Edison's employ and afterwards died, and he was succeeded by Charles Wurth, who had assisted Schultz-Berge.

Mr. Edison says that Wurth's work consisted in "duplicating and experimenting on and making better masters."<sup>3</sup> The purpose of making better master or original records, was to enable the making of better duplicates. Mr. Edison says :

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<sup>1</sup> C. R., 1076, p. 277; C. R., 1103, p. 315.

<sup>2</sup> C. R., 1076, fol. 553; C. R., 1103, fol. 825.

<sup>3</sup> C. R., 1076, fol. 567; C. R., 1103, fol. 839.



"The art was in a rather crude state in those days to what it is at present. We wanted to make the quality better and make them louder. We wanted to get rid of the listening tubes and use a funnel."<sup>1</sup>

In this statement Mr. Edison refers to one of the problems which it was necessary to solve before the business would warrant the extensive manufacture of duplicate records. The demand for phonograph records was limited by the fact that the sounds were not reproduced with sufficient loudness to enable them to be heard clearly with a horn. Listening tubes with ear pieces had to be employed. At that date phonograph records could only be made loud by sacrificing their quality. Mr. Edison's work, therefore, at this time, was largely directed towards improving the quality and loudness of the original or master records from which the duplicating molds were made. At the present time the duplicate records have the requisite loudness without injury to quality, which enables them to be heard through horns, and it is due to this fact, probably more than to any other, that the demand for these records has reached such large quantities.

It does not appear in the testimony just what course the work under Wurth took, with respect to processes of duplicating. Wurth himself is in Europe, and not available as a witness. One of his note-books is in evidence—"Complainant's Exhibit Wurth's Note Book"—and shows elaborate experiments upon the expanding process. This process evidently reached a condition of practical perfection as early as 1894, because at that time Charles Wurth's son, Albert Wurth, a boy without any previous experience, was put upon the work of making a large number of duplicates from a single mold by the "expanding" process. He made one thousand duplicates from mold F, which is in evi-

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<sup>1</sup> C. R., 1076, fol. 568; C. R., 1103, fol. 840.

dence, completing the work in December, 1894.<sup>1</sup>  
Albert Wurth testifies:

"The object was to see how many copies could be taken from one mold before the mold showed any signs of wear, and to see if the last duplicate would be just as loud as the first one made.  
\* \* \* The tests showed that the 1000th copy was just as loud and clear as the first. There did not seem to be any perceptible wear of the mold."<sup>2</sup>

Referring to the same work, Mr. Edison says:

"I remember that the thousandth record was as good as the first record, and that the mold was intact at the end of the thousandth record."<sup>3</sup>

Mr. Edison began to make commercial use of the expanding process in June, 1898, when duplicate records made by this process at his laboratory were furnished to the Complainant Company for use as masters on the cutting duplicating machines.<sup>4</sup>

This commercial use of the molded duplicates continued from that time on and became quite extensive, as appears by the testimony of Albert Wurth and by the entries made in the book "Complainant's Exhibit Wurth Plating Record." Just prior to making this first commercial use of his process of molding duplicates, Mr. Edison filed the application for patent No. 713,209, which is the patent in suit in case 1103.

The reason for using the duplicates molded by the expanding process as masters to make cut duplicates, instead of selling the molded duplicates directly, was

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<sup>1</sup> C. R. 1076, fol. 133; C. R. 1103, fol. 405.

<sup>2</sup> *Ibid.*, fol. 142; C. R. 1103, fol. 414.

<sup>3</sup> *Ibid.*, fol. 571; C. R. 1103, fol. 843.

<sup>4</sup> *Ibid.*, fol. 175; C. R. 1103, fol. 447.



because the duplicates molded by the expanding process were more expensive than the cut duplicates.<sup>1</sup>

The casting process as Mr. Edison had developed it at that time, viz., in 1898, was still more expensive than the expanding process due to the fact that the percentage of good duplicates secured was small. On this point, Mr. Edison says :

"At that time things were not well understood. It was quite difficult to bring out as large a number of records by the casting process that were good; in other words, the percentage of discards, as they are called, was too great to compete with the mechanical process. This was due to impure materials, production of gas bubbles, the sticking to the mold, and innumerable other defects. But with the pressing process the duplicate blank could be inspected and sized accurately, and it was known that the results would be good in almost every instance, and, therefore, until we could reach a point in the art whereby all the defects of the casting process were eliminated, the pressing process was preferable on account of the fact that the number of discards was exceedingly small."<sup>2</sup>

Mr. Edison, however, continued his work in the direction of perfecting the casting process, and being asked when he reached the point where the defects of that process were overcome, he replied :

"I believe it was somewhere about the date of my application on this casting process we got to a point where we were pretty near being able to compete with the mechanical process; in fact it got so far that I suggested to the National Phonograph Company that they better get Aylsworth and Miller to go ahead and get it down and see

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<sup>1</sup> C. R., 1076, folio 572; C. R., 1103, fol. 844.

<sup>2</sup> C. R., 1076, p. 144; C. R., 1103, p. 212.

how far they could carry it and reduce the discards and make it commercial, and I then dropped it and gave it over to those two experimenters."<sup>1</sup>

Having reached this point, Mr. Edison on May 8, 1900, filed his application for patent No. 667,662, the patent in suit in Case 1076.

Messrs. Aylsworth and Miller were skilled workmen, employed by Mr. Edison's Company, the complainant. They continued the work in the interest of the complainant and improved upon that variety of the casting process which consists in dipping a relatively cold mold in molten material. They had the advantages of Mr. Edison's laboratory, which adjoins the factory of the complainant, and they used the molds made for Mr. Edison's work by Wurth. They subsequently had special molds made by Wurth particularly for their process, one of these molds being made as early as March 28, 1900.<sup>2</sup> Their efforts in the direction of reducing the number of discards proved so successful that the complainant began the erection of a plant for carrying on their process in the latter part of 1900. This plant was completed in February, 1901.<sup>3</sup>

This plant was started in the manufacture of duplicates in February, 1901, with a capacity of about 500 duplicates per day, which capacity was later increased to 2,000 per day. A larger plant was erected in 1901, and began molding operations in September, 1901; its capacity was steadily increased until it reached 10,000 per day about March, 1902. On January 4, 1902, complainant had in stock ready for the market, 122,164 perfect duplicates made by this process.<sup>4</sup>

The complainant considered it necessary to have a large stock of duplicates and a large number of selections before offering the molded duplicates for sale and withdrawing the cut duplicates from the market. The molds for this manufacture were made in Mr. Ed-

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<sup>1</sup> C. R., 1076, p. 158; C. R., 1103, p. 226.

<sup>2</sup> C. R., 1076, p. 52; C. R., 1103, p. 120.

<sup>3</sup> C. R., 1076, fol. 446; C. R., 1103, fol. 718.

<sup>4</sup> C. R., 1076, p. 101; C. R., 1103, p. 169.



ison's laboratory and considerable time was required to secure the large number of molds necessary to give the variety of subjects desired. Although Edison had on hand a large number of molds, which had been made by Wurth and had been used for manufacturing duplicates by the expanding process, yet these were not used commercially with the Aylsworth & Miller process; because they did not have the right pitch of thread, they were somewhat shorter in length than Aylsworth & Miller wanted, and the records carried by them were made at a somewhat lower surface speed than Aylsworth & Miller decided to use.<sup>1</sup> Aylsworth & Miller applied for patents on their special improvements in July, 1900 (C. R., 1076, pp. 324 and 330; C. R., 1103, pp. 392 and 398).

Having made these extensive preparations for the marketing of the molded duplicates, complainant put them on the market on January 13, 1902.<sup>2</sup>

It appears that Mr. Edison's expenditure for the experimental work which he carried on through his assistants Schultz-Berge and Wurth, in perfecting his process of molding duplicates, amounted to \$38,385.76.<sup>3</sup>

#### DEVELOPMENT OF DEFENDANT'S MOLDING PROCESS.

It appears that Mr. Macdonald, the defendant's factory manager, who developed the defendant's process, did his first experimental work on the subject some time in 1899, and in his first deposition given for the defendant, he asserted that his first work in this direction was done in February or March, 1899,<sup>4</sup> that in the latter part of 1899, he obtained some records which were used as masters for the making of cut duplicates

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<sup>1</sup> C. R., 1076, pp. 116, 117; C. R., 1103, pp. 184-5.

<sup>2</sup> *Ibid*, pp. 104, 105, 360-6; C. R., 1103, pp. 172-3, 404-410.

<sup>3</sup> *Ibid*, p. 102; C. R., 1103, p. 170.

<sup>4</sup> D. R., 1076, p. 57; D. R., 1103, p. 51.

and that the molded records were made for sale early in 1900.<sup>1</sup> It appears that the mold he had in February, 1899, was not good enough to make commercially salable records from (D. R., 1076, p. 64; D. R., 1103, p. 58), and it was not until "early in 1900" that he had made a commercially successful duplicate record (D. R., 1076, p. 70; D. R., 1103, p. 64).

In a later deposition, he corrects these dates given for the use of the duplicates as masters for obtaining cut duplicates, and for the manufacture of duplicates for sale, by advancing the dates one year, from 1899 to 1900 and from 1900 to 1901. He adds:

"Molded records were first used sometime in the month of November, 1900. They were put on the market probably about the beginning of the year 1901."<sup>2</sup>

He makes no correction of the date of his first experiments, namely, February or March, 1899, and the accuracy of this date is made somewhat uncertain by his correction of the other dates, but certainly the dates for everything except these unsuccessful experiments should be advanced one year. But, without correcting the date for the beginning of his work, it would appear that he began his experiments in February or March, 1899, and reached a point where his duplicates were good enough for use as masters for the making of cut duplicates in November, 1900. Just what course his experiments took in the meantime does not appear, and hence the earliest date which can be accorded to him for the production of a successful result is November, 1900. At this time he filed the application for his patent No. 682,991, describing his process (C. R., 1076, p. 320). When Mr. MacDonald says that his molded duplicates were made for sale, or put upon the market about the be-

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<sup>1</sup> D. R., 1076, p. 60; D. R., 1103, p. 54.

<sup>2</sup> *Ibid.*, p. 80; D. R., 1103, p. 6.



ginning of the year 1901, he does not mean that they were sold as molded duplicates to the public, but only that some of the molded duplicates were put in stock with the cut duplicates and sold without distinction.<sup>1</sup>

It appears from the testimony of Belcher, the foreman of defendant's record department, that the defendant began to use molded records as masters for cut duplicates on November 2, 1900, that the molded records were tested and those that were suitable were used as masters, while the balance which were good as records were turned over to the stock room.<sup>2</sup>

It appears that those that were turned over to the stock room to be sold with the cut duplicates were records which were too much out of shape, evidently from warping during contraction in the molds, to be suitable for use as masters in making cut duplicates, and it also appears that they only had at that time two or three selections in the form of moulded duplicates.<sup>3</sup>

The defendant announced its moulded records for sale as such on February 15, 1902,<sup>4</sup> although the defendant claims that the circular which it sent out in January 1902,<sup>5</sup> was intended to offer their moulded duplicates for sale. An examination of this circular, however, shows no reference to the sale of moulded duplicates. It appears rather to be a description of the use of the moulded duplicates *as masters* in the making of cut duplicates.

The defendant has apparently been a close observer of the development of moulded records by the complainant. There is no testimony to show that Macdonald's work on the moulding of duplicates was inspired by what Mr. Edison was doing, although it is

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<sup>1</sup> D. R., 1076, p. 88; D. R., 1103, p. 14.

<sup>2</sup> D. R., 1076, p. 107; D. R., 1103, p. 33.

<sup>3</sup> *Ibid.*, p. 108; D. R., 1103, p. 34.

<sup>4</sup> C. R., 1076, p. 858; C. R., 1103, p. 402.

<sup>5</sup> D. R., 1076, p. 200; D. R., 1103, p. 378.

well understood that the migrations of the "talent" (vocal and instrumental artists, whose output appears on phonograph records) back and forth between the two factories, where they are alternately employed, furnishes unusual facilities for the disclosure of "secrets." It would be strange indeed if the extensive use of moulded duplicates in complainant's factory, beginning in June, 1898, was not known to Mr. Macdonald before he began his experiments in 1899, and there is nothing in his testimony inconsistent with the assertion that he had this knowledge. But the imitation by the defendant of the details of complainant's duplicate records since the time when both Companies put these moulded duplicates upon the market, is clearly shown.

The duplicates which the defendant put out in February, 1902, were brown in color, were made of a relatively soft material, so that their surface could be turned off to form "blanks" (a fact which was referred to in defendant's announcement) and they were provided with a spiral rib on their interior.

On the other hand, complainant's duplicates of that date were jet black in color, were made of a material which was too hard to record upon, and were provided with concentric rings on their bore. Their quality was also superior in a marked degree to the defendant's duplicates.

During the progress of this litigation the defendant has changed the character of its duplicates, copying the distinctive features of the complainant's duplicates, so much so that they cannot be distinguished by even the most expert person at a distance of two feet from the eye,<sup>1</sup> or far enough away to make it impossible to read the indistinct lettering impressed on the ends of the articles. The defendant has also changed its process since 1902 in respects which it is not willing to disclose (D. R., 1076, pp. 93-99 and 104 ;

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<sup>1</sup> C. R., 1076, p. 87 ; C. R., 1103, p. 155.



D. R., 1103, pp. 19-25 and 30), and presumably in the direction of complainant's process.

Having thus reviewed the testimony relating to the development of processes of molding duplicate phonograph records as employed both by the complainant and the defendant—matters pertinent to both cases—we will now separately consider the issues which the two cases present, taking up first case 1103 on the broader patent as the logical order.

**CASE 1103.**

Patent No. 713,209,<sup>1</sup> which is the patent in suit in this case, describes and illustrates the plastic expanding process with which Mr. Edison first succeeded in making practical and commercial molded duplicate phonograph records.

Many of the claims of this patent are limited to a process wherein a *solid* blank is expanded in a mold. Such claims are not in issue here, because the defendant deals with molten material.

Claims 2 and 3, however, are directed to that feature of Mr. Edison's invention which relates to the removal of the duplicate from a continuous mold by a diametric contraction of the duplicate sufficient to entirely clear the engaging surfaces of duplicate and mold and permit the duplicate to be withdrawn from the mold by a direct longitudinal movement. This feature being employed in a casting process, the infringement of these two claims is asserted.

**ANALYSIS OF PATENT 713,209.**

An analysis of the patent and of the second and third claims thereof is given by complainant's expert<sup>2</sup> and it is not necessary to repeat that analysis at length here. The patent starts out with the following statement:

"The object I have in view is to produce a practical process for the duplication of phonographic records whereby a practically unlimited number of duplicate phonographic records may be obtained which will be absolutely identical in every respect with the original record. Generally, I propose to construct a suitable matrix, prefer-

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<sup>1</sup> C. R., 1103, p. 356.

<sup>2</sup> C. R., 1103, pp. 12-22.



ably in metal, and by its use to impress duplicate phonograms with a phonographic record thereon, such phonograms being preferably constructed of a material having a greater coefficient of expansion than the material of the matrix or mold.

"By my process the duplicate phonogram or the surface thereof may be and preferably is constructed of a material too hard for the satisfactory cutting of an original record therein by the usual phonographic recorder, whereby the duplicate phonograms may be made more durable than it is possible to make original records; but the duplicate phonograms may obviously be made of a softer material.

"My improved process can be carried out for the reproduction of phonographic records of any desired form, either flat disks or hollow cylinders; but it has been specially devised for use in connection with the duplication of records of the latter type. For the duplication of cylindrical phonographic records from a tubular matrix, my improved process also provides for the effective removal of the finished duplicate from the matrix without injury to the record surface of the former."

It is upon the statement of the last paragraph that claims 2 and 3 here in issue are based, this statement referring to an independent feature of the invention, namely, a method of effective removal of duplicates from a tubular matrix without injury to the record surface of the duplicates.

The patent then proceeds to describe the construction of the tubular matrix by the coating of the original phonograph record with a conducting surface and electroplating thereon. Preference is expressed for the securing of the original coating by the process of vacuous deposit, as described in Edison's patents 484,582 and 527,147, but the patent says that the original record may instead be coated with "a very

thin layer of specially prepared plumbago of exceedingly great fineness," or with "gold leaf or silver salts reduced by chemical reagents to the metallic state." After the original record is plated to the desired thickness, the metal shell thus secured is preferably incased in a close-fitting cylindrical jacket, and the original record is removed either by dissolving or melting out the waxlike material or by contracting it radially and removing it by direct longitudinal movement. This results in "a hollow metal cylinder or tube, or one internally faced with metal carrying the phonographic record in relief upon its inner surface." The patent then describes the securing of the impression by heating a blank and expanding it in the mold. It continues:

"After the blank has been expanded so as to receive the impression of the matrix or mold, it is removed by first shrinking it radially in any suitable way, as in a refrigerating chamber, and by then withdrawing the resulting duplicate record by a direct longitudinal movement. Owing to the shallowness of the phonographic record groove, this radial shrinkage of the duplicate record effects a sufficient separation of the surfaces of the matrix and of the duplicate record to prevent injury to the surface of the duplicate record due to any longitudinal contraction thereof.

I find that by the process above described, and particularly when a matrix or mold is obtained by a process of vacuous deposit, as explained, duplicate phonographic records can be obtained which will be accurate reproductions of the original records and be free from extraneous noises and wherein the quality and intensity of the original vibrations will be reproduced with absolute faithfulness. I find, moreover, that since by this process there is little or no wear upon the matrix or mold, a practically unlimited number of duplicates may be obtained from a single matrix or mold."



The drawings illustrate the plastic expanding process, a tapering mandrel being used to effect or aid the expansion of the blank within the mold. These drawings are described in the patent, the description ending with the following statement:

"After the mandrel has been forced within the blank it is immediately withdrawn, and the blank is then chilled in any suitable way, such as by placing the matrix, with the blank contained therein, in a refrigerating chamber. In this way the blank or duplicate will shrink or contract radially, as shown in Figs. 3 and 3<sup>a</sup>, sufficiently to be removed from the matrix or mold by a direct longitudinal movement. Owing to the extreme shallowness of the phonographic record groove, a sufficient radial separation between the resulting duplicate and the matrix or mold will take place to prevent any longitudinal contraction of the duplicate from injuring the record surface thereof."

The patent describes the materials of which the duplicates are made as follows:

"These blanks may, therefore, be made of a relatively hard material, such as asphalt, or of stearic acid or stearate of soda mixed with varying proportions of fine precipitates—such as chalk, slaked lime or lamp black—or waxes or resins may be used, such as sealing wax or shellac mixed with fine precipitates, like chalk or polished ebonite, vulcanized hard rubber, or celluloid may be used, or glue may be employed, either alone or mixed with precipitates, such as chalk."

Claims 2 and 3, which are in issue, are as follows:

"2. The method of producing hollow cylindrical phonograms, which consists in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram within said mold,

releasing the phonogram from the mold by a radial contraction of the phonogram sufficient to entirely clear the surfaces and removing the phonogram from the mold by direct longitudinal movement."

"3. The method of producing hollow cylindrical phonograms which consists in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram within said mold, releasing the phonogram from the mold by a reduction in temperature sufficient to entirely clear the surfaces and removing the phonogram from the mold by direct longitudinal movement."

These claims are explained by complainant's expert as resting for their novelty upon the features relating to the removal of the duplicate from the mold, and as being broadly expressed and comprehensive with respect to the manner of forming the duplicate within the mold. The two claims differ from each other in that the third claim is limited to securing the diametric contraction by a reduction in temperature, while the second claim is not so limited and would cover a process in which a radial contraction of the formed duplicate was effected in any other way.<sup>1</sup>

#### DEFENDANT'S PROCESS.

The process of duplicating phonograph records employed by the defendant is a casting process in which a molten soap composition is introduced into a mold and is maintained in a heated condition therein so as to expel the air bubbles, after which the mold is cooled, first producing the setting or hardening of the material in contact with the surface of the mold, after which the core is withdrawn, and then by a further reduction in temperature the duplicate is contracted radially so

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<sup>1</sup> C. R., 1103, fol. 87.



as to entirely clear the engaging surfaces, and is then withdrawn from the mold by a direct longitudinal movement. Defendant's process is described and compared with claims 2 and 3 of the patent in suit by complainant's expert with the result of showing that it utilizes the invention set forth in these claims.\*

#### **CASE 1103—DEFENSE OF ANTICIPATION AND LACK OF INVENTION.**

Defendant's expert argues that the invention disclosed by claims 2 and 3 of the patent in suit is lacking in novelty, or if not that, is lacking in the quality of invention, in view of Edison's prior patent No. 484,582, before referred to, describing the casting of duplicates in a split mold, or in view of the practices and patents relating to the manufacture of phonograph blanks, or in view of the patents of Appelt, Lioret and Young. He reaches the conclusion that in view of this prior art the invention of the patent in suit must be limited to a process in which a solid blank is expanded in a mold, such a limitation of course relieving the defendant of the charge of infringement. We will consider these alleged anticipations in the order in which we have stated them.

#### **Case 1103—Edison's Split Mold Patent.**

The difference which is apparent at once between Edison's split mold patent and the patent in suit is that in the former the duplicate is released by the opening of the split mold, while in the latter a continuous mold incapable of being opened is employed and the duplicate is removed by diametric contraction. In discussing the split mold patent in complainant's *prima facie* case, complainant's expert referred to the fact that the making of a duplicate in a split mold was

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\* C. R., 1103, pp. 23-27.

accompanied by the difficulty of producing a duplicate having fins and burs on its surface, which would be obviously impracticable—meaning that the impracticability of such a result is at the present time obvious and requires no proof to support it. Defendant's expert seizes upon this statement of complainant's expert and argues that while the split mold patent does propose to release the duplicate by the opening of the mold, yet that the objection to this procedure would have been obvious at once to anybody trying to do it (and he asserts that complainant's expert agrees with him in this) and would immediately have been discarded for the obvious procedure of shrinking the duplicate out of the mold. He regards the shrinking of the duplicate out of the mold as a "step backwards," not requiring the exercise of invention, because all that the workman would have to do would be to omit to split the mold and to allow the cast duplicate to cool sufficiently to contract it away from the surface of the mold.

This is quite a different position from that which defendant's expert took in his earlier deposition given in case 1076. There he asserted that the split mold patent was a full disclosure of the idea of releasing the duplicate by a diametric contraction without opening the mold, because any one in attempting to cast a duplicate in a split mold would inevitably find out before he opened the mold that the duplicate had contracted away from the surface of the mold, and that there was no occasion to open the mold in order to remove the duplicate therefrom. His view at that time was that the setting or hardening of the material which would be necessary before the split mold could be opened would be inevitably accompanied by a diametric contraction which would clear the surfaces so much as to allow the duplicate to "rattle around" in the mold. But this view was based upon an entire misapprehension of the facts. In that case complainant's expert subsequently explained that in casting duplicates in molds, the material in setting does not undergo any diametric contraction, but may, in fact



expand, due to crystallization, and that after the material has set, a very considerable further reduction in temperature is necessary to contract the mass diametrically, so as to permit the separation of the engaging surfaces to be effected.<sup>1</sup> Mr. Edison and Mr. Aylsworth also gave testimony on this point, which appears in the present case. Mr. Edison states that there is a considerable lapse of time between the setting of the material and its contraction away from the surface of the mold, and that the setting of the material is not accompanied by contraction but rather by expansion.<sup>2</sup> Mr. Aylsworth, who made some accurate experiments to determine this point, shows that under different conditions the material sets in about three minutes, and requires a further lapse of time to disengage the surfaces, varying from 13 to 41 minutes, according to whether the mold is cooled artificially or is cooled by the atmosphere. The temperature of the material at the time of introducing it into the mold is 310° F.; when it is set it is about 220° F.; and when contracted sufficiently to be removed from the mold it is about 110° F.<sup>3</sup> The opinion of defendant's expert, expressed in case 1076, was evidently given without making the experiment and without knowledge of the conditions. His argument in the present case we regard as equally superficial, and as entirely unwarranted by the history of Mr. Edison's work. It appears that not only was the shrinking out of the cast duplicate not obvious, but that even after Mr. Edison's experiments had taken this direction Schulze-Berge, who carried on the experiments, met with innumerable difficulties, and was only able to attain success in isolated instances.

At the date of the application for the split mold patent there seems to have been two difficulties: One of those related to the character of the material employed, and the other to the character of the record

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<sup>1</sup> C. R., 1076, p. 173.

<sup>2</sup> C. R., 1103, p. 307.

<sup>3</sup> C. R., 1103, p. 303.

groove carried by the original record and reproduced in relief on the bore of the matrix. The soap compositions were necessary for the successful carrying on of the casting process, as Mr. Edison subsequently found out.<sup>1</sup> The invention of the circular recorder, which was after the date of the application for the split mold patent, also reduced the difficulties<sup>2</sup> and apparently made possible the shrinking out of the duplicates in an expanding process. It was far from obvious that shrinking of the duplicate was a practical way of freeing it from the mold. There were insurmountable difficulties at the time, and the suggestion of the release of the duplicate by opening a split mold before any injury to the record surface took place was the most practicable thing Mr. Edison knew of at the time. Mr. Edison undoubtedly appreciated the defects of the record due to the fins or burs which would be produced by the joints of the mold, but possibly he hoped to cure these defects in some way which is not now apparent.

On cross-examination Mr. Edison was asked if records made by the square recorder in use previous to 1890 could *now* be successfully duplicated by molding, and he replied that he had not tried it lately, but perhaps it could be done by the aid of the knowledge of to-day.<sup>3</sup> The defendant had its factory manager, Macdonald, make some experiments alleged to be of this character, which experiments are asserted to have been successful, but it appeared on cross-examination that Macdonald had used present day knowledge in many respects, such as the modern duplicating appliances of the defendant company, the present duplicating composition, an exceedingly shallow cut record, a modern recorder in all respects except for the shape of the point, a sapphire point, and a recorder with converging sides.<sup>4</sup> Even if it is possible at the present

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<sup>1</sup> C. R., 1103, fol. 821.

<sup>2</sup> C. R., 1103, fol. 824.

<sup>3</sup> C. R., 1103, fols. 887-90.

<sup>4</sup> D. R., 1103, pp. 27-29.



day and with the present duplicating compositions to successfully shrink a duplicate out of a mold made from an original record with a square cut record groove, we do not see that proof of that fact overcomes the testimony of Mr. Edison and his assistants to the effect that in 1888 it was found as *the result of experiment* to be impossible to secure that end under the conditions both as to shape of record and character of material which then existed. Besides this, it would not change the situation if Mr. Edison and his assistants are mistaken as to the *reason* for their failures of 1888. The fact remains that they were the persons of most skill in this art at that date, and they considered it necessary as the result of experiment to provide a split mold which could be opened for the release of the duplicate. Shrinking the duplicate was far from obvious to them as a practical way of removing it from the mold. Complainant's witness Wangemann says, referring to this period :

" At that early stage all the duplicates tried to be removed from an intact mold came out in pieces. I well remember examining such pieces under a microscope."<sup>1</sup>

Wangemann also refers to the fact that it was not until after the circular recorder was used that satisfactory duplicates were secured.<sup>2</sup> Aylsworth, when asked as to the result of Schulze-Berge's work with molds made from square groove records, says :

" The molds were more difficult to duplicate from, and in fact I don't remember of him ever making a successful duplicate from a record having the old square cut groove."<sup>3</sup>

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<sup>1</sup> C. R., 1103, fol. 545.

<sup>2</sup> C. R., 1103, fol. 527.

<sup>3</sup> C. R., 1103, fol. 755.

Again he says :

" I remember that after the round edge recorder came in use there were no split molds. Before that time they had both varieties."<sup>1</sup>

Finally, with reference to this Edison split mold patent as an anticipation of the invention of claims 2 and 3 of the patent in suit, we beg to refer to the testimony of complainant's expert, who considers and replies to the arguments of defendant's expert.<sup>2</sup> Complainant's expert calls attention to the fact that the second and third claims of the patent in suit were granted by the Patent Office with the split-mold patent in mind, that patent being referred to in the specification of the patent in suit. He calls attention to four differences between the disclosures of the two patents, leading to the conclusion that "the two patents differ in the apparatus employed, in the methods used and in the results obtained." Replying to the assertion of defendant's expert that the patent in suit is only patentably distinguished over the split-mold patent when the invention of the patent in suit is limited to the expansion of a solid blank within the mold, he says :<sup>3</sup>

" It is a sufficient answer to this argument to say that no suggestion is found in the 1892 patent of the possibility of using a continuous mold, and I understand that this splitting of the mold was regarded as a necessary thing when the invention of the 1892 patent was made. Moreover, I have pointed out in my previous deposition that at the date of the application for the 1892 patent the records were of such a character that they probably could not be satisfactorily duplicated in a continuous mold. Finally, it is a fact which I

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<sup>1</sup> C. R., 1103, fol. 786.

<sup>2</sup> C. R., 1103, pp. 247-8.

<sup>3</sup> C. R., 1103, fols. 989-90.



have verified by experiment that in casting a duplicate in a mold no perceptible contraction takes place until a very considerable reduction in temperature has been effected after the material has actually set, and is, therefore, actually hard enough to be removed by opening a divided mold, requiring say from 10 to 40 minutes, so that it would be by no means obvious, as Mr. Cameron seems to suppose, that this contraction would be observed by anyone attempting to make duplicates in a split mold."

The distinction which Mr. Cameron seeks to establish between the patent in suit and the split mold patent is evidently not the real distinction between those patents, at least so far as the second and third claims of the patent in suit are concerned. The essential difference between the inventions of the two patents with respect to these claims is not the fact that one describes a pressing process and the other discloses a casting process, but is the fact that with one the duplicates are removed by shrinking them diametrically to clear the engaging surfaces, and with the other by opening the mold sections after the material has set.

**Case 1103—Practices and Patents Relating to the Manufacture of Phonograph Blanks.**

Another argument made by defendant's expert is that the practices and patents relating to the manufacture of phonograph blanks furnish an anticipation of claims 2 and 3 of the patent in suit either in themselves or as furnishing to the art the information lacking in the Edison split mold patent.

It appears that since 1888, when Mr. Edison introduced into the art the phonograph blank constructed

wholly of wax or waxlike materials (Patent No. 382,462, May 8, 1888),<sup>1</sup> phonograph blanks have been made by casting them in hollow cylindrical molds around cores placed in the center of the molds. But this process has never been carried on practically in such a way as to produce *a finished surface* upon the blank. The blanks always have a rough unfinished surface, which it is necessary to turn off by cutting tools so as to give the smooth surface required to record upon. It appears that Macdonald tried some experiments in 1895 with a view to casting a blank with a finished surface, but nothing came of the experiments because the blank was found to be too hard for practical use in record making.<sup>2</sup>

The commercial processes of manufacturing phonograph blanks have all been developed by Mr. Edison, and his patents on this subject are the only ones referred to by defendant's expert. Mr. Aylsworth, who was connected with this development, describes what it has been.<sup>3</sup> He says that at first the blanks were cast experimentally in a split mold, which was opened to take the blanks out. In the first commercial manufacture of blanks they were cast in a brass mold around a brass core. He says:

"The molten wax was poured in, and when set to the proper stage the core was driven out with a mallet. This operation broke a great many of the blanks, and a great many more were broken in trying to remove them from the mold after the core was out. In taking the blank out of the mold, they had a ring which fitted inside the mold and was about the same size as the blank. This they hammered on to loosen the blank from the mold."

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<sup>1</sup> C. R., 1103, p. 368.

<sup>2</sup> D. R., 1103, p. 49, fol. 217.

<sup>3</sup> C. R., 1003, pp. 186-189.



The surface of the blank required to be turned down before it could be used. Castor oil, and in some instances graphite, were used to facilitate the removal of the core from the cylinder and also the cylinder from the mold. The castor oil was applied by rubbing it over the core and over the inner surface of the mold. Up to about 1895 the molding was carried on in this way with the use of castor oil as a lubricant.

"Sometime around about 1895 they began molding by withdrawing the blank from the mold while it was hot and in a semi-plastic condition. In this condition it was found that the blank was self-lubricating and could easily be withdrawn from the mold. After the blank and core were withdrawn from the mold, the blank was removed from the core by a turning motion which unscrewed the blank from the core."

After the removal from the mold, the blank was allowed to season, when it was reamed, edged, and lastly turned off to a smooth surface and a standard diameter. Mr. Aylsworth says that the blank is reduced by cutting off one-sixteenth of an inch in diameter to secure a smooth surface. This is the process which is used at the present time by complainant in the manufacture of blanks. It is evident that such a process could not be used for the manufacture of duplicate records, the first condition of which is that a finished perfect surface shall be made in and by the molding operation. The witness Pierman describes the practice followed in making phonograph blanks in defendant's factory,<sup>1</sup> and it is apparently the same as that used by complainant.

Mr. Edison also describes the practices followed in molding phonograph blanks,<sup>2</sup> confirming the statements made by Aylsworth. He was asked if he found

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<sup>1</sup> C. R., 1103, pp. 174-176.

<sup>2</sup> C. R., 1103, fols. 852-56.

any difficulty in getting the blanks out of the mold without using a lubricant, and he answered:<sup>1</sup>

"Yes, sir. They used to stick in the mold. There was corrosion on the mold, which probably caused the sticking and a lot of other troubles. A great many times we tried to dispense with the castor oil, but we had no luck with it. Afterwards they depended with it by pulling the molded blank out when it was plastic, being soft enough that it had a sort of lubricating surface and permitted them to push it out. It was very desirable to get rid of the oil because we wanted to use the scrap, and if the oil did get into the scrap it deteriorated the quality of the blank."

The sticking of the material to the mold Mr. Edison now thinks might have been obviated to some extent by gold plating the molds used in blank manufacture the same as his record molds are plated, but he says that they did not think of doing that.<sup>2</sup> The casting of phonograph blanks has always been a rough operation designed to produce the blanks cheaply and without a finished surface, that surface being subsequently given to the blanks by turning them off. Mr. Edison expresses the opinion that the practices followed in the manufacture of phonograph blanks do not warrant the criticism that the molding of duplicates in continuous molds and shrinking them out was obvious in view of the blank-manufacturing practices.<sup>3</sup>

Complainant's expert describes the practice in the manufacture of blanks<sup>4</sup> and states:

"In the manufacture of blanks there is no diametric contraction which results in a separation of the

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<sup>1</sup> C. R., 1103, fol. 853.

<sup>2</sup> C. R., 1103, fols. 903-4.

<sup>3</sup> C. R., 1103, fol. 852.

<sup>4</sup> C. R., 1103, pp. 267-8.



surfaces, but in every instance the blanks are forcibly removed from the molds before such contraction takes place. Of course in the manufacture of duplicates the forcible removal of the molded articles would ruin the record surface. In blank manufacture the essential object is economy of production, and consequently the blanks are removed just as soon as possible. The conditions of the two arts are so dissimilar that no analogy between them can be drawn. The products are different and the methods of procedure differ widely. In blank manufacture the molded article is in an incomplete condition and requires to be subsequently shaved off, whereas in the manufacture of duplicates, the molded article, so far as its surface is concerned, must necessarily be completed."

One would not expect to find, in view of this history of the art of manufacturing these rough and incomplete blanks, anything in the patents relating to that manufacture which would anticipate a process of duplicating phonograph records with their delicate and highly finished surfaces. Defendant's expert, however, calls attention to one of Mr. Edison's patents relating to blank manufacture, namely, No. 382,417 of May 8, 1888, which he thinks anticipates the invention of claims 2 and 3 of the patent in suit. This patent describes a method of finishing phonograph blanks without turning them off. The blank is first cast in a *split* mold around a core, the mold being opened to release the blank. This blank is then finished by pressing it in a die, which the patent says "may be a divided die or one that is solid." This die is a hollow cylinder made of highly polished speculum metal, and the blank being placed in the die, a tapering plunger is forced into the blank, such plunger being also of highly polished speculum metal, and by forcing the plunger into the blank, the blank being still slightly plastic, the blank will be given, according to the

patent, "the exact shape and size both externally and internally that it is desired the blank should have." After the pressure is applied, according to the patent, "the plunger is then removed from the blank and the blank removed from the die, when it will be ready for use on a phonograph."

Defendant's expert *thinks* that it is the intention of this patent to shrink the blank out of the polished die, but there is nothing of the kind stated in the patent, and the fact that the patent says that the blank is given by the die and plunger the exact shape *and size*, both externally and internally, that it is desired the blank should have, makes it quite certain that the intention was to maintain the pressure of the plunger until the blank cooled and was incapable of shrinking further. If any shrinkage was contemplated, the exact shape and size would not be produced by the die. Complainant's expert considers this patent and replies to the arguments of defendant's expert.<sup>1</sup> In addition to the distinctions which have already been referred to, complainant's expert states that it is clear to his mind that defendant's expert is incorrect in his conclusions,

"because, if Mr. Edison, at the date of the application for the patent under consideration, knew that even a smooth article could be removed without injury to its surface by diametric contraction, he would not have provided the additional complication of a smooth finishing die, but would have completed the operation by a single step in a perfectly smooth mold."

This patent is again considered by complainant's expert at another point in the record,<sup>2</sup> in answer to

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<sup>1</sup> C. R. 1103, pp. 252-4.

<sup>2</sup> C. R. 1103, p. 268.



other arguments advanced by defendant's expert.<sup>1</sup> In this latter connection, complainant's expert also considers other patents relating to the manufacture of phonograph blanks referred to by defendant's expert.

In patent No. 393,462, to which defendant's expert refers, Mr. Edison makes the following interesting statement :

" As has been made known by my prior applications for patents, the phonogram blank which I prefer to employ is one made entirely of wax or a wax composition, in the form of a cylinder, having a cylindrical outer surface and a tapering bore. These blanks I mold from the wax composition as described in prior applications ; but the excessive contraction of the wax in cooling, makes it impossible to give such blanks by molding the precise size externally and internally that they should have for use upon my phonograph. I have attempted to reduce these molded blanks to the exact size for use both by pressing them in a finishing die and also by cutting them both externally and internally with proper tools. These methods of finishing the blanks have, however, objections

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<sup>1</sup> Defendant's expert, in his answers to questions 10 and 11 (D. R., 1103, p. 118), makes an argument against the patent in suit on the assumption that the patent date of May 8, 1888, on the boxes which contain complainant's duplicate records refers to Mr. Edison's patent No. 382,417, describing the finishing of a blank in a finishing die. On cross-examination (D. R. 1103, p. 129) he was forced to admit that there are two other patents dated May 8, 1888, the inventions of which are employed in complainant's duplicate records and which would fulfill the conditions of the patent mark. It is evident from reading the claims of patent 382,417 that the invention covered by that patent is not involved in complainant's duplicate records, but defendant's expert professed to be ignorant upon this point. Complainant's expert explains that the patent date of May 8, 1888, refers to these two other patents and not to the patent 382,417 (C. R., 1103, fols. 1084-5). The assertions of defendant's expert in this matter on his direct examination were positive and unequivocal. The instance serves to illustrate the superficial character of the treatment of the case by defendant's expert.

which it is the object of my present invention to overcome."

In this statement Mr. Edison refers to the practice of shaving and reaming the cast blanks to bring them to proper size and shape and to give them smooth external and internal surfaces, and also to the expedient of placing the blank after been cast in a finishing die, as set out in the earlier patent No. 382,417. The "excessive contraction" to which he refers was evidently not such as could be utilized to produce a true and smooth surface in the mold, but was rather a *contraction which resulted in the warping of the blank out of shape* and which made it necessary to cast the blank of a larger size than the finished product and then to reduce it to the proper size and shape and give it a proper finish by cutting it both externally and internally. The Edison patent No. 393,462 continues:

"By my present invention I first mold the blank from the wax composition, making it slightly larger than the finished blank, and I then finish the blank by cutting it both externally and internally with heated knives or cutters."

The employment of heated, as distinguished from cold, knives or cutters was the particular feature of the invention.

On the same date Mr. Edison took out two other patents, No. 393,463<sup>1</sup> and No. 393,464<sup>2</sup>, on the heated cutting tools employed in carrying out the process of patent No. 392,462.

In his patent No. 406,576, to which defendant's expert also refers, Mr. Edison proposes to make a phonogram blank, the main portion of which is made of asphalts or bitumens to which is added from five to seven per cent. of carnauba wax. The carnauba wax

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<sup>1</sup> C. R., 1103, p. 372.

<sup>2</sup> C. R., 1103, p. 376.



is a material which the patent says shrinks or contracts greatly in solidifying, and by adding this to the asphalt the patent says

“a compound is formed which shrinks slightly in hardening and can therefore be readily removed from the mold.”

The patent also says :

“I prefer to use a split mold, so that the cylinder can be readily removed from the mold.”

Defendant's expert seems to think that the statement contained in this patent regarding the slight shrinkage of the blank is of itself sufficient to demonstrate the fact that it was obvious to experts in the art that a duplicate sound record could be cast in a continuous mold and withdrawn from the mold by cooling. But this patent furnishes no warrant for such a conclusion, the reference to the preferred use of a split mold indicating that notwithstanding the contracting qualities of the carnauba wax added to the composition, the mold itself was intended to be opened to effect the final release of the blank.

There is nothing, therefore, in any of these blank manufacturing patents which even suggests that a phonograph *blank* (much less a phonograph duplicate *record*) can be formed in a continuous mold with a finished surface and removed therefrom by diametric contraction so as to clear the surfaces and permitting the withdrawal of the blank by direct longitudinal movement without injury to the surface.

But even if the fact had been established in the manufacture of phonograph blanks that such blanks could be formed in molds and shrunk therefrom with a finished surface, we would still assert that this does not negative the quality of invention in the adaptation of that process to the manufacture of duplicate phonograph records, because of the difference in the character of the surfaces to be dealt with, and also because

of the protracted course of experimentation which had to be gone through with, and the many difficulties which had to be overcome, before the process of duplicating phonograph records involving this feature became a useful or commercial possibility.

The peculiarly delicate character of the surface of a phonograph record is referred to at a number of points in the record. In considering the relation of Mr. Edison's blank-manufacturing patent No. 382,417, and the Appelt patent on the manufacture of drawing rollers for spinning machines, complainant's expert says :

" A phonograph record \* \* \* is characterized by a surface formed of millions of excessively minute waves, the largest of which are of microscopic dimensions, and some of which appear under the microscope as still smaller sub-waves carried by the larger ones and probably representing overtones. The *maximum width* of the very largest of these waves is .01 of an inch (hardly thicker than a moderately heavy sheet of paper), while their *maximum depth* is less than .001 of an inch, or about the thickness of a sheet of tissue paper. Moreover, these excessively minute variations in the record surface are of well defined forms, which cannot be changed without altering the quality of the reproduced sounds. Furthermore, the record is to be duplicated in a relatively soft material, capable of being marred and injured by the slightest fault in the operation and especially when in a soft and receptive condition. Obviously the accurate duplication of such a microscopic yet enormously complex surface would apparently present many times the difficulties which would be encountered in casting a perfectly smooth cylinder. For instance, in the former case a relative movement between the cast article and the mold of only .001 of an inch might obliterate the entire surface, whereas in the latter case, dealing with a smooth surface, the article



might be moved back and forth or turned around in the mold without the slightest injurious effect to the character of its surface. There would apparently be as much difference between the carrying on of these widely different operations as between the manufacture of armor-plate where we deal with furnaces of gigantic proportions and enormous hammers exerting pressures of thousands of tons, and the manufacture of Swiss watches where the operations are largely performed under the microscope."<sup>1</sup>

### **Case 1103—The Appelt Patent.**

Defendant's expert calls attention to the Appelt patent as an illustration similar to that furnished by Edison's blank-finishing patent No. 382,417 and as supporting his argument that those skilled in the art would understand from Edison's split-mold patent that the duplicate could be cast in a continuous mold and released therefrom by a diametric contraction. This Appelt patent relates to the manufacture of drawing rollers for spinning machines. It evidently has no bearing on this controversy, because it relates to a different and non-analogous art in which the same conditions do not exist. It also differs in many other respects which are stated by complainant's expert<sup>2</sup> and which it is not considered necessary to here set forth.

### **Case 1103—The Lioret Patent.**

Defendant's expert also finds an anticipation of the invention of claims 2 and 3 of the patent in suit in

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<sup>1</sup> C. R., 1103, p. 249.

<sup>2</sup> C. R., 1103, folios 1000-6.

the Lioret U. S. patent 528,273 granted October 30, 1894. This patent, although applied for and granted later than Mr. Edison's date of invention, is to be regarded as a part of the prior art because of the amendment to Section 4886, R. S., made by Congress in 1897, which amendment provides that an invention to be patentable must not have been "patented or described in any printed publication in this or any foreign country \* \* \* more than two years prior to his application," meaning the application for the patent on the invention. This amendment of the law applies only to applications filed on or after January 1, 1898, and since the application for the patent in suit was filed in March of that year, the amended law is applicable to that patent.

Lioret describes the manufacture of a peculiar original record, and also of a peculiar duplicate record, both without utility in the art because they could not be used with the phonographs and graphophones, hundreds of thousands of which are in the hands of users, from whom the demand for duplicate records comes. Lioret proposes to make a master or original record by recording on the apex of a sharp ridge formed on a steel cylinder. He then proposes to secure a matrix or mold of this peculiar master record by electroplating thereon and removing the electroplated shell, which matrix would have the record formed at the bottom of a similarly sharp spiral groove. Duplicates are to be made from this matrix by placing a cylindrical blank of celluloid therein, inside of which blank is fitted a tapering mandrel. The whole being immersed in hot water, the celluloid is softened and the tapering mandrel is driven into the celluloid blank while the blank and mold are still immersed, forcing the blank outwardly into the spiral groove of the matrix so as to receive the impression of the sound record contained in the bottom of the groove. The parts are then removed from the water and the mandrel is withdrawn from the blank. The removal of the duplicate from the mold is thus described by Lioret :



"I then plunge the whole into cold water and the celluloid recovers its hardness and is at the same time generally contracted sufficiently to permit the easy withdrawal of the ring *c* from the mold *a*<sup>1</sup> by unscrewing it therefrom. If, however, the contraction of the ring *c* in this way is not sufficiently greater than that of the mold *a*<sup>1</sup>, the mold may be slightly warmed by heat externally applied."

Complainant's expert calls attention to the fact<sup>1</sup> that this patent was cited by the Patent Office against the Edison application<sup>2</sup> and also against the Joyce application<sup>3</sup>, the records of the prosecution of both these applications being before the Court. In both these applications arguments were presented which satisfied the Examiner that the Lioret patent was not a pertinent reference to the process involved in the patent in suit.

Complainant's expert refers to the difference in the character of the original masters used by Lioret and Edison, and states that this difference makes the processes different and results in the production of an entirely different kind of duplicate. Referring to the unscrewing of the Lioret duplicate from the mold, complainant's expert says: <sup>4</sup>

"Of course the expedient of unscrewing a duplicate phonograph record from the mold would be entirely impracticable in the modern art, since the duplicate would have to be revolved more than 400 times to clear it, and it would be impossible to prevent the obliteration of the record in this operation."

<sup>1</sup> C. R., 1103, p. 254.

<sup>2</sup> D. R., 1103, p. 153.

<sup>3</sup> C. R., 1103, p. 416.

<sup>4</sup> C. R., 1103, fol. 1019.

Referring to the article which Lioret proposes to produce, complainant's expert says :<sup>1</sup>

"A duplicate record obtained by the Lioret patent will necessarily have the record formed on top of a spiral rib, and such a record could not be used in connection with any standard talking machines at present on the market or which were on the market, so far as I know, at the date of Lioret's patent."

He also says :<sup>2</sup>

"With that process [the Lioret process] it is not possible to radially contract the phonogram sufficient to entirely clear the surfaces, nor is it possible to remove the phonogram from the mold by a direct longitudinal movement."

The Lioret patent is therefore clearly distinguished from the invention covered by claims 2 and 3 of the patent in suit.

#### **Lioret Inoperative.**

Further than this, it appears that the Lioret patent is absolutely and hopelessly inoperative. Complainant's expert, with the assistance of Albert Wurth, conducted a series of experiments which establishes this proposition. A steel master was made as described in the Lioret patent, and upon this a copper coating was placed, but it was found impossible to remove the coating from the master, the two being as intimately engaged as if welded together.<sup>3</sup> Another steel master record was then coated with a film of wax, which had to be very thin to prevent obliteration of the record, and this film was rubbed with graphite to give a conducting surface

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<sup>1</sup> C. R., 1103, fol. 1020.

<sup>2</sup> C. R., 1103, fol. 1023.

<sup>3</sup> C. R., 1103, p. 262,



upon which to plate, and a shell was then plated over this master. It was found possible to remove the shell, although with difficulty and only by the application of great force, the record being completely destroyed by the efforts exerted in unscrewing the shell from the master record.<sup>1</sup> In order to determine what could be done with such a mold if secured, a master record was then made upon a wax cylinder, the record being formed on the top of a spiral ridge. This was then first coated with gold and then plated with copper, and the copper deposit was backed up with a brass ring to form a complete mold. It was found that the wax master could not be removed by shrinking, because the longitudinal contraction firmly engaged the threads of the master and mold and prevented the separation of the two. It was consequently necessary to break out the wax master.<sup>2</sup> Attempts were then made to secure a celluloid duplicate with this mold in the manner described by Lioret, but after the celluloid blank had been softened and forced outwardly against the mold by a tapering mandrel and the mold and enclosed celluloid ring cooled, it was found impossible, even when ice was employed to effect the cooling, to easily unscrew the record from the matrix. The longitudinal shrinkage locked the threads of the engaging surfaces together so that the duplicate was wedged into the mold. It was only found possible to unscrew the duplicate by cutting keyways in its bore, into which a key was fitted, so that by holding the key in a vise, a powerful wrench could be applied to the mold. The operation of unscrewing the mold from the duplicate was a tedious one and required half an hour's hard work. The result of this forcible unscrewing of the duplicate was to entirely destroy the record.<sup>3</sup> This demonstration of the inoperativeness of the Lioret patent was

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<sup>1</sup> C. R., 1103, p. 263.

<sup>2</sup> C. R., 1103, p. 264.

<sup>3</sup> C. R., 1103, p. 265.

also testified to by Albert Wurth, who assisted in the work.<sup>1</sup>

We assume from the cross-examination of Albert Wurth that defendant's counsel will argue that the failure of the experiments was due to employing an unnecessarily deep thread on the master record which (he may argue) is not contemplated by Lioret, who says that "the threads of the matrix are very fine in practice and are very much exaggerated in the drawings to facilitate the illustration"; but the fineness of the thread makes no difference so long as the shape and proportions are maintained, and nothing is said in the Lioret patent about changes of proportions between the height of the thread and its width at its base. A relatively high sharp thread was evidently contemplated by Lioret, because he wished to secure a thin edge of steel upon which to make the record. Of course if a thread was employed which was very shallow and hence had a small height compared with its width, the effect would be substantially the same as making the record upon a plain surface and the contraction would clear the surfaces and permit the direct longitudinal withdrawal of the duplicate. Lioret, however, contemplates threads which will overlap after the contraction has taken place, so that it will be necessary to unscrew the duplicate from the mold. It was with threads of this character that complainant's expert and Albert Wurth made the experiments, and those experiments show that whatever the fineness of the thread, if the threads overlap after contraction, as Lioret says they will, the duplicate produced will be without utility. This argument of defendant's counsel (if made) will, however, cover only one feature of inoperativeness of the Lioret patent, namely, that relating to the removal of the duplicate from the mold, and will not call in question the other feature of inoperativeness, namely, that relating to the production of the mold itself.

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<sup>1</sup> C. R., 1103, pp. 297-300.



Another feature of inoperativeness in the Lioret process which the experiments of complainant's expert did not go far enough to determine (because defects at earlier steps in the process prevented this point from being reached) is that the attempt to expand a blank under water in such a mold as Lioret suggests would result in entrapping more or less water in the threads of the mold, the effect of which would be to prevent the surfaces of the blank and mold from coming into intimate contact at the points where the water was entrapped, thereby injuring the perfection of the record. In the prosecution of the application for the Edison patent 713,209 this defect of the Lioret process was pointed out.<sup>1</sup> It is also admitted by defendant's expert.<sup>2</sup>

### Case 1103—The Young Patent.

The Young English patent of 1894 proposes to make duplicate phonograph records by using a mold such as that described in Mr. Edison's split mold patent, and evidently without splitting the mold. He proposes to introduce into the mold a "*very thin* hollow cylinder" of material capable of being *collapsed*, buckled or folded inwardly, such as celluloid, xylonite or vulcanite.

This tube, the patent states, is "of the same size externally as that of the original wax cylinder upon which the record was first taken," and, consequently, such a tube would be slightly larger than the bore of the mold. The mold "is now warmed or slightly heated by any convenient means," and the very thin, collapsible blank is then inserted within the mold, this being, no doubt, possible by reason of the slight expansion of the mold in being heated, but certainly possible by first collapsing the blank and introducing it within the mold. The blank is then "rendered pliable by a gentle heat (which may be that given off

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<sup>1</sup> D. R., 1103, p. 184.

<sup>2</sup> D. R., 1103, p. 149.

by the heated electro and its casing)," and is then pressed "gently and evenly up to and against the face of the electro," so as to take an impression.

The Young patent continues :

" When the said plastic cylinder has cooled, I am enabled, by slightly collapsing this inwardly, to cleanly and easily remove it from the electro."

This patent is considered by complainant's expert.<sup>1</sup>

He says regarding Young's description of removing the duplicate by collapsing :

" Of course, dealing with a very thin collapsible blank, and particularly with a blank which normally is slightly larger than the bore of the mold, these operations are necessary."<sup>2</sup>

After the duplicate has been secured, it is returned to its tubular form as accurately as may be possible and is then mounted on a cylindrical base of the same character as the original record thereby forming a *composite article* capable of use on standard talking machines.

Complainant's expert says :

" The essential difference between the Young process and that patented by Edison in the patent in suit, is that Young deals with very thin tubes which are capable of collapsing inwardly so as to be removed, whereas Edison makes in the first instance a relatively thick duplicate, usually of friable material not capable of collapsing both because of its thickness and of the material used, but which requires to be contracted diametrically to clear the engaging surfaces before it can be removed. Consequently the Young patent does not anticipate either the second or third claim of the

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<sup>1</sup> C. R., 1103, pp. 257-60.

<sup>2</sup> C. R. 1103, fol. 1030.



Edison patent in suit, because those claims are both limited to the idea of diametrically contracting the duplicate so as to clear the engaging surfaces in order that the duplicate may be longitudinally removed."<sup>1</sup>

Complainant's expert also calls attention to the fact that

"The Young process, even if it were a practical one, necessarily results in a different product from that obtained by the Edison process, namely, a composite record formed of a relatively thick backing covered by a very thin shell carrying the record surfaces."

The Edison split mold patent of 1892 also describes making records—

"by taking sheets of smooth material, like waxed paper or tinfoil and pressing them upon the surface of a mold by a plunger or otherwise, the sheets being afterwards backed up by a wax, resin or cement."

Commenting on this, complainant's expert says:

"This would indicate that even to the extent of using very thin material and making composite records, the earlier Edison patent anticipates Young's suggestion. This being so the only advance which appears to have been made by Young over the Edison split mold patent, was the suggestion of the possibility of making duplicates on very thin collapsible tubular blanks, so as to permit the duplicates to be removed by collapsing them inwardly as Young fully describes."<sup>2</sup>

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<sup>1</sup> C. R., 1103, fol. 1031.

<sup>2</sup> C. R., 1103, fol. 1034.

Commenting further on the relation of the Edison split-mold patent and the Young patent to the inventions of the patent in suit, complainant's expert says:

"It is clear, however, that the invention broadly covered by the second and third claims of the Edison patent in suit is just as fully distinguished from the Young patent as it is from the earlier Edison patent.

Neither the Young patent nor the earlier Edison patent *recognized the possibility of making non-collapsible duplicate phonograph records in a continuous mold and afterwards contracting them diametrically to permit their longitudinal removal.*

If Young had recognized this possibility, he would have seen that it was possible to remove the original master record from the mold by contracting the former diametrically to clear the engaging surfaces, as is now done in the commercial practice of the art, since this allows the original record to be preserved for the making of future molds. It is evident that Young did not appreciate this possibility, because he refers to the removal of the original record only by melting it out of the mold, and consequently the original record would be destroyed."<sup>1</sup>

Defendant's expert states his position as follows:

"I do not regard Young's suggestion that he can remove a very thin cylinder from the mold by cooling and then slightly collapsing it as constituting a substantial difference between his method and that defined in the Edison patent in suit, since any one skilled in this art would at once perceive that when he cooled the phonogram, its contraction would be sufficient to permit its ready removal from the mold without the slight collapsing action mentioned in the Young patent."<sup>2</sup>

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<sup>1</sup> C. R., 1103, fol. 1035.

<sup>2</sup> D. R. 1103, p. 103.



This position is based upon a failure to understand the conditions which the Young patent prescribes, since, as pointed out by complainant's expert, with the very thin tube made of the same size as the original record from which the mold was made, and with the use of only a gentle heat to secure plasticity, and without using artificial refrigeration to reduce the temperature below that of the atmosphere, the thin tube could not be removed from the mold without collapsing it.

While defendant's expert could not be induced to take this view on his cross-examination, he did admit that the Young process could be carried on without securing a contraction sufficient to clear the engaging surfaces. He says (D. R., 1103, p. 151):

"It appears to me that Young, in order to avoid a loss of time incident to waiting for the mold to cool entirely, partially collapsed it after it had had its temperature somewhat reduced."

Even on this view of Young's disclosure a person practicing the Young process would not inevitably find that the duplicate contracted sufficiently to clear the engaging surfaces, as defendant's expert suggests on his direct examination, but he would collapse the tube and remove it from the mold before the contraction had reached this point.

The Young patent was referred to by the Patent Office Examiner in the consideration of the application for the Edison patent in suit, and the claims of the Edison patent were allowed with the Young patent directly in mind. This fact, while, of course, not conclusive upon the Court, is at least persuasive, because it shows the construction which the experts of the Patent Office placed upon the Young patent.

It also appears that such a product as Young proposes to make would be impracticable and without utility. Upon this point complainant's expert says:

"Even if it were possible, by carrying out the Young process, to make a duplicate phonograph

record, which I very much doubt, such a record would necessarily be very imperfect and not commercially salable, for the reason that owing to the thinness of the material used, the impressed record would appear in negative on the bore of the blank, and when mounted on a cylindrical support there would be a tendency for the record to become obliterated, especially as celluloid is subject to a very slow contraction due to the evaporation of its solvent, and the pressure on the base would tend to press the indentations of the record outwardly. The successful record is one which possesses a sufficient body of material as to result in the formation of the impression directly in the surface by molecular rearrangement instead of by a bodily distortion as takes place with very thin material. In other words, the material must be sufficiently plastic to receive a surface impression instead of being 'pliable' as Young states to thereby be capable of a bodily distortion."<sup>1</sup>

#### **Invention in View of Lioret and Young.**

The argument advanced by defendant's expert, that in view of the Lioret and Young patents, no invention was required to make a duplicate phonograph record by a process which involves the use of a continuous hollow mold and the removal of the duplicate therefrom by contracting it so as to entirely clear the engaging surfaces, is without merit, especially in view of the protracted experiments which were necessary to secure a successful result. Indeed, it seems clear to us that the Lioret and Young patents show that this method of making duplicate phonograph records was not obvious and required invention to produce it, because neither of these experimenters saw that a successful result could be accomplished in this way; but

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<sup>1</sup> C. R., 1103, p. 260.



on the contrary they suggested other and ineffective expedients to reach the same end.

As the Circuit Court of Appeals, Fourth Circuit, said in *Farmers Co. vs. Spruks Co.* (127 F. R., 693):

"It cannot be said that a patent for a device which fails to accomplish the desired end, is an anticipation of one which successfully accomplishes it."

See, also,

*Morey vs. Lockwood*, 8 Wall, 230.

*Bridgeport Wood-Finishing Co. vs. Hooper*,  
5 F. R. 63.

*Mutheson vs. Campbell*, 77 F. R. 282.

*Crown Co. vs. Ideal Co.*, 123 F. R., 666.

**CASE 1103—DEFENSE BASED ON LIMITATIONS OF CLAIMS TWO AND THREE BY THE TERMS OF THE PATENT IN SUIT, AND BY THE HISTORY OF ITS PROSECUTION.**

Defendant's expert not only reaches the conclusion that claims two and three of the patent in suit must be limited to a process in which a solid blank is expanded in a mold as being the only distinguishing feature over the prior art—a conclusion which we have shown is unwarranted by an examination of the prior art—but he also asserts that this limitation is made necessary by a consideration of the terms of the patent in suit itself, as well as by the history of the prosecution of the application for the patent in the Patent Office.

These two defenses will now be considered.

**Suggested Limitation of Claims 2 and 3 of the Patent in Suit by its Terms.**

The patent in suit refers to the prior split mold patent in connection with the description of the making of the mold or matrix.

Taking this prior split mold patent as the basis for his argument, and assuming that it negatives novelty

or invention in the feature of the manner of disengaging and removing the duplicate from the mold, defendant's expert seeks to find in the patent in suit some other distinction over the split mold patent than that involved in the method of removing the duplicate from the mold, and he finds that difference in the specific description of the expanding process in which a solid blank is expanded in the mold.

It will at once be seen that the argument of defendant's expert is based upon a false premise, namely, that the split mold patent negatives novelty or invention in the method of removing the duplicate from the mold.

Defendant's expert also ignores the explicit terms of the patent in suit itself, which describes an invention of a two-fold character, viz., (1) the particular expanding method, and (2) the particular removal method.

The patent in suit says :

"For the duplication of cylindrical phonographic records from a tubular matrix, my improved process also provides for the effective removal of a finished duplicate from the matrix without injury to the record surface of the former."

It is upon this statement that the novelty of claims 2 and 3 is based, and in view of this statement there would seem to be no warrant for the assertion of defendant's expert that "the only departure from previous practice" described in the patent in suit "is in the formation of the record by the expansion of a solid blank within the mold."<sup>1</sup>

Having reached the erroneous conclusion that the patent in suit by its terms makes the invention rest wholly upon the method of forming the duplicate in the mold, defendant's expert then seeks to find a meaning for the words "forming a hollow cylindrical plastic phonogram within said mold," which appear

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<sup>1</sup> For a discussion of this matter by complainant's expert, see C. R., 1103, pages 232-5.



in both claims 2 and 3, such as will distinguish this feature of the claims over Edison's prior split mold patent.

Now, since the split mold patent describes a casting process (which, generically speaking, is what the defendant uses), any limitation of claims 2 and 3 to a special method of "forming" the duplicate which will distinguish those claims over the split mold patent must, defendant's expert argues, necessarily exclude a casting process, and hence would take defendant's operations outside of the claims.

But complainant's expert points out that one understanding the bearing of the patent in suit on this art, and familiar with the history of the prosecution of the application for the patent in suit

"would have no difficulty in seeing that the essential features of the claims are found in the third and fourth steps thereof, consisting in contracting the duplicates diametrically so as to clear the engaging surfaces and then removing them longitudinally."<sup>1</sup>

Complainant's expert shows that the interpretation which defendant's expert seeks to give the "forming" element of these claims would not distinguish that element over the Lioret patent, and adds :

"It is evident, on the face of the claims, that they cover *generically* any process for 'forming' duplicates, but are limited to the *specific* process for removing the duplicates."<sup>2</sup>

Pursuing the line of thought that claims 2 and 3 must be distinguished over the Edison split mold patent, by giving special significance to the words "forming a hollow cylindrical plastic phonogram within said

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<sup>1</sup> C. R., 1103, page 236.

<sup>2</sup> C. R., fol. 945.

mold," defendant's expert argues that the word "plastic" in these claims means (D. R., 1103, p. 85)

"bringing a solid impressionable material (*i. e.*, a material capable of being molded by the means in contemplation) into contact with the mold surface, as distinguished from bringing a liquid material into contact therewith and permitting the liquid to congeal."

And he adds :

"It is to my mind clear that this is the line which the patent draws between what is included and what is excluded from it."

The experts have discussed at length the meaning of the word "plastic" in these claims. Complainant's expert takes the view that it defines the *characteristics of the material* used in making the duplicates—*i. e.*, the duplicate or phonogram is of plastic material—and since the defendant admittedly uses the same material as complainant and the same class of materials as that referred to in the patent in suit, it is evident that if the expression "plastic phonogram" applies to the materials of the patent in suit, it must necessarily apply to the materials used by the defendant.<sup>1</sup>

Referring particularly to the argument of defendant's expert that the word "plastic" defines the method of operation rather than the characteristic of the material, complainant's expert points out that there is no broad line of demarcation between a pressing process and an expanding process in respect to this matter. He says :<sup>2</sup>

"With any process the material receives and retains an impression when it is in the peculiarly receptive condition known as 'plasticity'. This

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<sup>1</sup> C. R., 1103, fol. 950.

<sup>2</sup> C. R., 1103, fol. 952.



is purely a result of molecular arrangement. With a pressing process, the solid blank is gradually heated until it reaches the plastic state, and in this condition takes and retains the impression. With a casting process, the liquid mass gradually cools, and when it reaches the plastic state it takes and retains the impression. With both processes, the material, when the impression is received and retained, is in substantially the same molecular condition."

Defendant's expert agrees with complainant's expert in the view that the word "plastic" refers to the condition of the material,

"at the instant when it receives the impression from the mold \* \* \* without regard to the fact as to whether or not it retains this condition after the operation is completed."<sup>1</sup>

And he also admits on cross-examination (D. R., 1103, pp. 140-1) that in the casting process, and with materials such as defendant uses, the material is in a plastic condition at the time when it takes the form of the mold and is self-supporting. Evidently before that time the material is without form, because it could be poured out of the mold, and consequently at the time of receiving its form, or taking the impression from the mold, the material is in the same condition as it is in a pressing process. The only difference is that the operation is started from opposite ends of the temperature scale. With the pressing process the material is raised in temperature from the solid condition to a condition of plasticity, while in the casting process the material is reduced in temperature from a molten condition to a condition of plasticity; and in case of both processes, the material is given form, or takes its impression from the mold, while in the same condition.

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<sup>1</sup> D. R., 1103, p. 138.

But there are other considerations which show that the word "plastic" as used in claims 2 and 3 of the patent in suit is not open to the interpretation given by defendant's expert. That word does not appear in the body of the specification. Its meaning, however, is made clear by the history of the introduction of claims 2 and 3 into the Edison application.

Complainant's expert reviews this history<sup>1</sup> and shows that the expression "forming a hollow cylindrical plastic phonogram within said mold" was first introduced into the Edison application in a claim suggested by the Patent Office Examiner for the purpose of securing an interference between the Edison application and the Joyce application.

The Joyce application describes a casting process and the expression referred to was therefore intended by the Patent Office Examiner as being a broad description of the forming step of the process which was sufficiently comprehensive to cover either the pressing process specifically described in the Edison application, or the casting process specifically described in the Joyce application.

The first claim of this character suggested by the Examiner was inserted into the Edison case, and was subsequently modified slightly into the form of claim 3 of the Edison patent, and a similar claim designed to cover the same subject matter, but in a somewhat broader form, was introduced and became claim 2 of the Edison patent. These two claims were made the issue of the Interference between the Edison and Joyce applications, which Interference was decided in favor of Edison.

The word "plastic" was taken by the Examiner from the Joyce application, and an examination of that application, as complainant's expert points out, shows that the word "plastic" was used as defining the characteristic of the material and not as defining the

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<sup>1</sup> C. R., 1103 pp. 239-42.



method employed. On the consideration of these matters, complainant's expert concludes :<sup>1</sup>

" For these reasons, aside from the general considerations referred to, it is evident that Mr. Cameron's argument is based upon a wrong foundation, and that the expression in question not only cannot exclude a casting operation, as he says, but must apply to such an operation just as effectively as to a pressing operation. In other words, a review of the prosecution of the Edison and Joyce cases fully supports my opinion that the expression in question is designed as a broad and generic statement of any appropriate manipulation of an impressionable material for the purpose of forming a duplicate phonogram in a cylindrical mold."

#### **Suggested Limitation of Claims 2 and 3 by the Prosecution of the Application.**

Certain claims were erased in view of the Lioret and Young patents, particularly the former, and the argument was made that these claims were broader than applicant's invention, which was limited to *expanding* a blank as distinguished from *displacing* a blank. These claims related to the "forming" feature of Edison's invention and did not specify in detail the "removing" feature of the invention.

The idea which Mr. Edison's attorneys before the Patent Office had in mind, was that so far as the peculiar expanding process is concerned, Edison expanded a blank into contact with the surface of a mold, so as to take a surface impression, whereas Lioret was obliged to displace the material of the blank into the grooves of the matrix before the record indentations could be reached.

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<sup>1</sup>C. R. 1103, fol. 967.

As complainant's expert says :

"This distinction, which was presented by way of argument to the Examiner, it will be noted related entirely to the first portion of Edison's invention and had nothing whatever to do with the special procedure followed in the removal of the duplicates. The distinction referred to was, however, never accepted by the Examiner as distinguishing the particular pressing operation described by Edison from the particular pressing operation described by Lioret." <sup>1</sup>

He further says :

"No claim was ever presented and withdrawn by Mr. Edison that can be fairly said to accurately define his invention and particularly the important part of the invention relating to the removal of the duplicates." <sup>2</sup>

In making his argument in this matter, defendant's expert overlooked the two-fold character of Edison's invention. Even as to the claims which relate to the peculiar expanding process, the distinction which Edison's attorneys before the Patent Office made by argument, did not become a feature of those claims, because that distinction was not accepted by the Patent Office, and hence, even as to these claims that argument cannot be regarded as establishing a limitation ; but since the argument was not made respecting any claim which involved the details of the other part of the invention, *i. e.*, that relating to the removal of the duplicates, or any claim similar to claims 2 and 3 of the patent in suit, no limitation of claims 2 and 3 can be predicated upon that argument. That argument at least was not carried into the

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<sup>1</sup> C. R. 1103 fol. 975

<sup>2</sup> *Ibid*, fol. 977.



patent by any change in claims 2 and 3, or in claims of similar import.

As was said by Judge ARCHBALD, speaking for the Circuit Court of Appeals, Third Circuit, in *Boyer vs. Keller Tool Co.* (127 F. R., 134) :

" We accept for the purposes of this case all that can in any event be legitimately claimed for the argument of counsel addressed to the Examiner \* \* \*. At the same time it is to be observed that the meaning of counsel in this connection is not entirely clear, and whatever be the concession contained in it, not having been carried into the patent by any change in the claims as made, we by no means agree that it limits the terms of such claims as finally allowed."

See, also,

*Acme Flexible Clasp Co. vs. Carey Mfg. Co.*, 96 F. R., 344.

*Societe Anonyme Usine vs. Reh fuss*, 75 F. R., 657.

*Daylight Prism Co. vs. Marcus Prism Co.*, 110 F. R., 980.

*Diamond Drill Co. vs. Kelly*, 120 F. R., 282.

*Diamond Match Co. vs. Ruby Match Co.*, 127 F. R., 345.

Defendant's expert repeats his argument regarding the limitation of claims 2 and 3 by the prosecution of the patent in the Patent Office in his consideration of the Lioret and Young patents. The argument is the same, however, and the answer to it is found in the same considerations.<sup>1</sup>

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<sup>1</sup> C. R., 1103, p. 261.

CASE 1103—DEFENSE OF DOUBLE  
PATENTING.

Defendant's counsel may argue that claims 2 and 3 of the patent in suit are invalid because of double patenting, in view of Mr. Edison's patent of earlier date but based on a later application and describing the casting process, viz., patent 667,662, which is the patent in suit in case 1076. We infer that this argument will be made because defendant's expert makes the assertion that, regarding patent 667,662 as a part of the prior art, the only difference between claims 2, 4 and 5 of that patent and claims 2 and 3 of the patent in suit is a difference in scope unless claims 2 and 3 of the patent in suit are limited to the expanding of a solid blank within the mold.

"Double patenting" occurs where the *same inventor* has taken two patents on the *same invention*. The defense based on this situation has recently received much attention from the Courts because of the decision of the Supreme Court in *Miller vs. Manufacturing Co.*, 151 U. S., 186, the meaning of which was at first not fully understood but has now been definitely settled as producing no change in the law as established by earlier cases. Where the *same invention* is claimed in patents granted to *different inventors*, the question which arises is one of *priority of invention*, and this, in the absence of proof as to the respective dates of invention, is determined by the dates of filing the applications for the respective patents, the patent based upon the earlier application being regarded as the prior patent.

*Pope Co. vs. Gormully Co.*, 144 U. S., 244.

Where, however, the two patents for the *same invention* are taken by the *same inventor*, the date of invention must be the same in both cases irrespective of the dates of the applications for the two patents, and under these circumstances the Courts have decided



that the patent of later date of grant is invalid. This conclusion has been based upon the proposition that an inventor cannot prolong his monopoly by taking a second patent for the same invention. The discussion by the Courts has therefore turned upon the question—*When are two patents for the same invention?* In considering this question the Courts have borne in mind the principle that forfeitures are not favored in law, and have endeavored to so construe the grant of protection to afford, if possible, protection to the inventor for that meritorious thing which he has given to the public and so as to be coextensive with his real invention.

In *Electrical Accumulator Co. vs. Brush Co.*, 52 F. R., 138, the Circuit Court of Appeals for this Circuit, in considering the question of double patenting, said :

“If Letters Patent were to be treated by Courts in the critical and hostile spirit which a plea in abatement formerly encountered, the contention of the defendant would have technical importance ; but Courts do not construe Letters Patent for the purpose of their destruction.”

In determining whether two patents are for the same invention, *the claims* of the patents are of primary importance, because it is only when their claims are intended to cover or in fact cover and control the same subject matter that the patents can be said to cover the same invention.

*Thomson-Houston Co. vs. Elmira Co.*, 71 F. R., 404.

It may be regarded as settled, at least for the purposes of the present case, that if two patents describe and show the *same structure* and have claims directed to the *same essential part* of that structure, even though the claims may differ somewhat in form or breadth of expression, the two patents will be regarded as covering the same invention.

*Thomson-Houston Co. vs. Hoosick Co.*, 82 F. R., 461.

*Thomson-Houston Co. vs. Union Co.*, 86 F. R., 636.

*Thomson-Houston Co. vs. Jeffrey Co.*, 101 F. R., 121.

The Courts have been most concerned in recent years in considering the question of double patenting in its bearing upon two patents to the same inventor, one of which claims a *dominating* invention and the other claims a *specific* invention which is within the *scope* of the claims for the dominating invention.

The usual case is one where the patents are based upon different structures, and one of them claims the broad invention and the other claims a specific form or improvement upon the structure of the broad patent. If in that case the broad patent is first applied for and granted, there can be no question that the later specific or improvement patent is valid, at least so far as any question of double patenting is concerned. The second patent is not for the same invention as the first patent. This has been recognized from the start as fundamental in our patent law. Thus the Supreme Court, in *O'Reilly vs. Morse*, 15 How., 122, said, in upholding an improvement patent granted to Morse :

"There is nothing in the act that forbids him to take out a new patent for the improvement if he prefers it. Any other inventor might do so, and there can be no reason in justice or in policy for refusing the like privilege to the original inventor."

It is now also equally well settled that where the broad patent, based upon the earlier application is granted later than the specific or improvement patent based upon the later application, the later broad patent will not be open to the objection of double patenting, but the dates of the respective applications will be regarded as controlling in considering the relation of the two patents.

*Thomson-Houston Elec. Co. vs. Elmira & H. Ry. Co.*, 71 F. R., 396.



*Thomson-Houston Elec. Co. vs. Ohio Brass Co.*, 80 F. R., 712.

*Dayton Fan & Motor Co. vs. Westinghouse Elec. & Mfg. Co.*, 118 F. R., 562.

*This is the case at bar.*

The patent in suit is based upon an application filed March 5, 1898, while patent 667,662 is based upon an application filed May 8, 1900, or upward of two years later. The grant of the patent in suit was delayed by numerous interferences, so that that patent was not actually issued until somewhat less than two years later than the grant of patent 667,662. The two patents bear the relation to each other of generic and specific patents based upon different inventive disclosures; or, as put in some of the cases, that patent 667,662 is for an improvement upon the invention disclosed by patent 713,209. Comparing claims 2 and 3 of patent 713,209 with claims 2, 4 and 5 of patent 667,662, it will be seen that the claims of the latter patent are limited to a process including "introducing a *molten* material in the mold to receive a surface impression" from the record carried in negative on the bore of the mold and "in allowing the *molten* material to set;" whereas claims 2 and 3 of the former patent state a process defining the corresponding element as "forming a hollow cylindrical plastic phonogram within said mold," this step of the process being based upon the specific disclosure of expanding a solid plastic blank within the mold as distinguished from the specific disclosure of the latter patent in which the material in a molten form is introduced into the mold and allowed to set therein. *It is evident that the claims of patent 667,662 do not cover or include the expanding process specifically described in patent 713,209.*

Mr. Aylsworth points out that the casting process has an advantage over the pressing or expanding process "in both cost of production and also in the quality of the product,"<sup>1</sup> and Mr. Edison makes a

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<sup>1</sup> C. R., 1103, fol. 1212.

similar statement.<sup>1</sup> Defendant's expert says on this point: "The difference is, in my opinion, a very material one. The casting method is simpler, cheaper and produces a better duplicate."<sup>2</sup>

This situation brings the patents in these two suits under the doctrine established by the cases last cited, *i. e.*, that where the earlier patent filed on the later application is based upon a different specific disclosure or covers an improvement on the later patent based on the earlier application, the later patent is not invalid although it may have claims which dominate the invention of the earlier patent.

Defendant's counsel will not dispute the weight of this authority, but we apprehend he will argue that it is not applicable to the present situation.

Defendant's expert says:

"If the act of melting and pouring the material into the mold and allowing it to congeal, whereby it receives the configuration of the interior surface of the mold, is *regarded as the equivalent* in this art of expanding a solid body so as to cause it to receive the impression of the interior surface of the mold, then the invention defined in claims 2 and 3 of the patent in suit, would be *the same invention* as that set out in Edison's prior patent No. 667,662, and claims 2 and 3 of the patent in suit would *differ* from claims 4 and 5 of the said prior patent *only in scope*. The invention defined in the two patents would be the same, though the breadth or scope of the claims mentioned would differ."<sup>3</sup>

And again:

"Complainant's expert, however, has held that the patent in suit, and particularly claims 2 and 3

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<sup>1</sup> C. R., 1103, fol. 1226.

<sup>2</sup> D. R., 1103, p. 123, fol. 179.

<sup>3</sup> D. R., 1103, p. 89.



thereof, are broad enough to include the casting of molten material as well as the expanding of solid material. If this view is correct, then, in my opinion, patent No. 667,662 and the patent in suit are for the same thing or the same invention, the only difference being as to the breadth or scope of the claims defining the invention."<sup>1</sup>

These statements of defendant's expert, we assume, indicate the position of defendant's counsel on this question, but this position is one which is not supported by authority. The position of complainant's expert is not that the casting process is the equivalent of the expanding process in the sense that the two are the same invention, but that the casting process is the equivalent of the expanding process *for the purpose of determining the question of infringement* of claims 2 and 3 of Edison's broad patent 713,209.

Complainant's expert says :<sup>2</sup>

"Making a comparison between the special expanding process particularly described in the patent in suit and the casting process used by the defendant \* \* \* the only difference between the two operations is that in one the wax-like material is introduced in the form of a solid cylinder, while in the other it is introduced in a molten condition. This difference does not alter the question of the mechanical equivalence of the two operations; in fact, the expression 'mechanical equivalent' presupposes a difference. If the two operations were more closely allied, they would be mechanically identical."

All of the statements of complainant's expert relating to the equivalency of the casting and expanding processes are open to this explanation—namely, that for the purpose of deciding the question of infringe-

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<sup>1</sup> D. R., 1103, p. 125.

<sup>2</sup> C. R., 1103, p. 50.

ment of claims 2 and 3 of the patent in suit, the casting process is to be regarded as the equivalent of the expanding process. So far from regarding the two processes as identical and as not patentably distinguished over each other, complainant's expert expresses the contrary view. He says that each of these processes "has its special advantages,"<sup>1</sup> and he proceeds to describe those advantages while asserting that the differences are not material on the consideration of the question of infringement.<sup>2</sup>

In stating that the casting process is the equivalent of the expanding process for the purpose of determining the question of infringement of claims 2 and 3 of the patent in suit, which are not limited in terms to any particular method of forming the duplicate in the mold, complainant's expert was only taking the view of the doctrine of equivalents which has been well established by the Courts.

In *Morley Machine Co. vs. Lancaster*, 129 U. S., 263, although the Lancaster machine involved devices unknown at the date of the Morley patent and which devices had been subsequently invented and patented, yet those devices were regarded as the equivalents of the devices of the Morley patent for the purposes of infringement. The Court said (129 U. S., p. 290) :

"In this sense the mechanical devices used by the defendant are known substitutes or equivalents for those employed in the Morley machine to effect the same result; and this is the proper meaning of the term 'known equivalent' in reference to a pioneer machine such as that of Morley. Otherwise, a difference in the particular devices used to accomplish a particular result in such a machine would always enable a defendant to escape the charge of infringement, provided such devices were new with the defendant in such a machine, because, as no machine for accomplishing the re-

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<sup>1</sup> C. R., 1103, fol. 99.

<sup>2</sup> See, also, C. R., 1103, fols. 202 and 1171.



sult existed before that of the plaintiff, the particular device alleged to avoid infringement could not have existed or been known in such a machine prior to the plaintiff's invention."

And in *McCormick vs. Talcott*, 20 How., 405, the Court said :

"If he [the patentee] be the original inventor of the device or machine called the divider, he will have a right to treat as infringers all who make dividers operating on the same principle and performing the same functions by analogous means or equivalent combinations, even though the infringing machine may be an improvement on the original and patentable as such."

See, also, *Walker on Patents*, 4th Ed., § 354.

It thus appears that an invention of later date and independently patentable may be the equivalent of an earlier invention for the purpose of determining the question of infringement of the claims of the patent based upon the earlier invention. The position of defendant's expert seems to be that the later patent based upon the earlier application cannot have a *dominating claim* without making that patent open to the objection of double patenting. But defendant's expert is clearly in error as to this, because that was the precise situation of the Van Depoele and Tesla patents in the three cases last above referred to (*supra*, pp. 68-9). Thus in *Dayton Co. vs. Westinghouse Co.*, 118 F. R., 562, the Court said (p. 572):

"Then it is also said that claim 1 of patent No. 511,559 is broad and generic, and that it covers the patent No. 416,193 previously issued. It is true that the claim referred to is of the character ascribed to it. We have so treated it, but it does not follow that it covers the former invention. As we have explained, it does not cover it, because the former patent is for an independent invention

of special means for fulfilling some of the requirements of the broad patent."

Again (p. 574) :

"We have no disposition to depart from the rules in respect to the identity of patents, and the method of determining it, here adverted to, which we deem sound and reasonable ; but it would be a misapplication of them, and contrary to their spirit and purpose, to say that independent inventions may not be the proper subjects of independent patents, even though they may relate to the same subject matter, and one may dominate the other in the same field."

In the other set of Van Depoele cases before referred to (*supra*, top p. 68), where another patent of Van Depoele's was found invalid on the ground of double patenting because the broad and specific claims were based upon the same structure and the same inventive disclosure, the courts made clear the distinction between that situation and one where the patents were based upon different structures or different inventive disclosures. In *Thomson-Houston Electric Co. vs. Hoosick Ry. Co.*, 82 F. R., 461, the Court said (p. 466) :

"We should concur if we could regard the later patent as the generic one, and the earlier, so far as it relates to the contact device, as limited to the structural improvements upon that device.  
\* \* \* Of course, if the claims of the earlier patent do not specify such a tension device as is described and claimed in the later, but specify one which embodies only a subordinate improvement upon it, the patents are not for the same invention."

Defendant's counsel may argue that the statements of complainant's expert regarding the equivalency of the casting process for the expanding process (for the purposes of determining the question of infringement



of claims 2 and 3 of Edison's broad patent 713,209) amount to an admission that the casting process is not patentable over the expanding process, and that therefore the two patents, being for inventions which are not patentably different, must be regarded as for the same invention under the authorities on double patenting. The statements of complainant's expert do not amount to such an admission, because he recognizes the specific differences between the two processes. But even if the two processes were not patentably different, that fact would not make the patents for the same invention under the doctrine of double patenting. The question then to be determined by the Court is not one of double patenting, but whether the difference between the two patents is a patentable one; and in deciding that question the patent which was *applied for last*, even if granted first, must be treated as the junior patent, since the dates of the applications, and not the dates of the patents, control.

*Barbed Wire Patent*, 275 U. S., 281.

*Walker on Patents*, 4th Ed., p. 170.

This point was directly ruled upon by the Circuit Court of Appeals, Sixth Circuit, in *Thomson-Houston Electric Co. vs. Ohio Brass Co. (supra)*. In considering the question whether the improvements covered by the Van Depoele patents of earlier grant and later application were patentable over the broad invention covered by the patent of later grant and earlier application, the Court said (80 F. R., 724):

"The claims, all of them, include and refer to one or the other of these improvements. Now, it is not material to this discussion [the question of double patenting] whether these improvements are patentable or not. They are expressly claimed as improvements, and no attempt is made by the patentee to cover anything but them. If inventions at all, then they are separable from the old switch and trolley combinations, and, if they are not inventions, the patents are void and cover nothing."

## CASE 1103—INFRINGEMENT.

The argument of defendant's expert upon this proposition is based upon the assertion that claims 2 and 3 of the patent in suit are limited to a process wherein a solid blank is expanded in a mold, the conclusion that this limitation is a necessary feature of these claims being reached by defendant's expert (1) because he considers it the only distinguishing feature over the prior art, (2) because he thinks it is made necessary by the language of the patent in suit, (3) because he thinks the arguments advanced in the prosecution of the Edison application have that effect, and (4) because he thinks the relation between the patent in suit and Edison's casting patent which forms the basis for case 1076, makes the limitation necessary.

We have shown that there is no foundation for any one of these positions, and that claims 2 and 3 of the patent in suit are generic so far as the "forming" part of the process is concerned, and are specific so far as the "removing" part of the process is concerned. If our view of this matter is right, there can be no doubt that the defendant infringes these claims. Indeed, defendant's expert does not deny infringement when the claims are given this interpretation. The infringement of these claims is pointed out by complainant's expert in his *prima facie* deposition,<sup>1</sup> and the position of defendant's expert is replied to in the rebuttal deposition.<sup>2</sup>

**The Patent in Suit is a Pioneer Patent upon a Primary invention.**

Finally we insist, upon the question of infringement, that the patent in suit is a pioneer patent covering a primary invention and as such is entitled to a liberal interpretation.

*Walker on Patents*, 4th Ed., Sections 359 to 362, and cases cited.

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<sup>1</sup> C. R., 1103, pp. 23-27.

<sup>2</sup> C. R., 1103, pp. 272-3.



By the invention of the patent in suit Mr. Edison for the first time accomplished the remarkable result of successfully and commercially molding duplicate phonograph records. The testimony all goes to support this proposition. Complainant's expert says:

"So far as I know, the patent in suit presents for the first time in this art a disclosure of a process for making an unlimited number of accurate duplicates of a phonographic record, and therefore stands at the very foundation of the art."<sup>1</sup>

Again:

"I have been associated for many years with a great variety of inventions of all sorts, and I am confident that the effective duplication of a phonograph record presents the most brilliant and remarkable invention that I have ever been brought into contact with. If anyone has carefully examined a phonograph record under the microscope and appreciates the conditions which Mr. Edison had to deal with, he will, I believe, share my opinion. If I did not know of the possibility of duplicating such a record, I would say that it simply could not be done."

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"That problem was solved only when he [Edison] made the brilliant discovery that a duplicate record, after having been formed, could be contracted with sufficient uniformity and to a sufficient extent as to carry the impressed surface of the duplicate away from the mold without injuring the very delicate material in which the impression was formed, and permit the duplicate to be taken out of the mold without any injurious effect to the record."<sup>2</sup>

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<sup>1</sup> C. R., 1103, fol. 188.

<sup>2</sup> C. R., 1103, p. 289.

Molded duplicate phonograph records were not known commercially prior to the invention of the patent in suit, and as a result of that invention they are now manufactured and sold in enormous quantities. Patents on inventions of this character are liberally interpreted by the Courts, with a view of securing to the inventor the substantial benefits of his invention.



**CASE 1076.**

Patent No. 667,662,<sup>1</sup> which is the patent in suit in this case, describes and illustrates a casting process for securing duplicate phonograph records. It presents

“the first disclosure of an operative process for producing duplicate phonograph records by a casting process, and it has gone very largely into practical use.”<sup>2</sup>

The patent says :

“My invention relates to an improved process for duplicating phonograph records, and the process is of the character covered by my patent No. 484,582 of October 18, 1892, wherein a matrix of an original record is employed as a mold for the making of the duplicates. In the specific process described in my previous patent, the matrix secured from the original record is divided longitudinally so as to form a sectional mold, in which are cast the desired duplicates. My present invention is designed specifically as an improvement on said process, and my object is to provide a process wherein the production of the duplicate records will be facilitated, and wherein the character of the resulting duplicates will be improved, since the mold used is continuous on its bore.

“My present process depends upon the fact that after a molten metallic soap or a mixture of soaps or other suitable material has been introduced within a mold carrying the representation of a phonographic record in relief on its bore and allowed to set, a sufficient contraction of the resulting duplicate can be secured as to permit of a longitudinal separation of the duplicate from the mold, whereby a continuous mold can be employed for the carrying on of the process.”

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<sup>1</sup> C. R., 1076, p. 314.

<sup>2</sup> C. R., 1076, fol. 658.

It should be remembered that when the application for the patent in suit was filed, Mr. Edison already had on file in the Patent Office the application for patent No. 713,209, the patent in suit in case 1103, covering broadly the duplication of phonograph records in continuous molds and describing specifically the expansion of a solid blank in the mold.

The application for the patent in suit was intended to cover the special process of making duplicates in continuous molds by a *casting* process, using *molten* material. Mr. Edison has testified<sup>1</sup> that it was only with certain materials, viz., mixtures of soaps and waxes, that he found he could utilize the casting process for making duplicates in continuous molds.

This fact is referred to in the last paragraph of the matter just quoted from the patent in suit. At another point in the patent it says, speaking of the material of which the duplicates are made :

"The material in the tank 1 and of which the duplicate records are to be formed may be of any suitable character ; but preferably it is a metallic soap or a combination of several soaps, to which has been added a material not affected by water, such as ceresin, whereby the resulting duplicates will be protected from the effects of atmospheric moisture."

The material here referred to—namely, metallic soap and ceresin, is that which is employed by the defendant for the manufacture of its duplicate records (D. R., 1076, p. 81, Q. 5 ; D. R., 1103, p. 120).

In order that the process of the patent in suit might be understood, "a suitable apparatus for the purpose" is illustrated, wherein the material, maintained in a molten condition, is drawn up by means of a plunger into the bottom of a continuous cylindrical record mold, thus giving the conditions of quiescence and

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<sup>1</sup> C. R., 1076, pp. 138 and 156.



non-aeration or freedom from air bubbles which is essential to the successful working of a casting process. The patent says, regarding the operations which take place in carrying out the process with this apparatus:

"The liquid molten material entering the mold 9 will engage all portions of the record formed on the bore thereof, and the materially lower temperature of the mold will result in the almost instantaneous chilling of the surface of the molten material therein. In order to facilitate this surface chilling of the liquid molten material entering the mold, the latter may be actually cooled by artificial means below atmospheric temperature—as, for instance, by the circulation of cold water through a water-jacket surrounding the mold or by a blast of cold air equably directed to all portions of the mold. The chilling of the surface of the molten material in the mold results in the setting of the positive impression thus secured from the negative record. The chilling of the molten material in the mold progresses toward the centre, and any contraction in bulk will be compensated by the surplus material within the cap 11. As soon as the material within the mold has been chilled throughout the entire thickness thereof, the material with the piston, core, cap and plunger are removed from the cylinder, and the material is allowed to cool by exposure to a cold atmosphere or by an air blast until the solidified material has contracted away from the bore of the mold so as to permit it to be removed therefrom by forcing the plunger downward. The plunger is then removed from the core and the latter is extracted from the cast duplicate, carrying the positive record on its periphery, before the material has contracted sufficiently upon the core as to prevent this separation. Since the conductivity of heat from the material is effected slowly, the outer surface of the molded duplicate becomes hard and set, while

the inner portion thereof next to the core is still in a relatively plastic condition, so that this separation of the core can with ordinary care be readily effected. The resulting duplicates thus secured after reaching the normal temperature are properly dressed at the ends and are reamed internally to the proper size, being then ready for use."

Having described the process of making duplicates in the special apparatus, the patent proceeds :

"With records made by my process, the contraction of the material radially to separate it from the mold is accompanied by a considerable longitudinal contraction following the instant when the surface is first set by the chilling effect of the mold, and progressing until the material reaches the normal temperature, such shrinkage being approximately one per cent. with ordinary blanks. For this reason it is desirable that the original record from which the matrix is made is formed on a phonograph or allied talking machine having a fewer number of threads on its feed-screw than the instrument on which the duplicates are finally used, in order that when the contraction has progressed to its finality, the pitch of the record thread on the duplicate will correspond to the pitch of the feed-screw of the reproducing machine, or approximately to that pitch, it being possible with modern reproducing apparatus to effect a satisfactory reproduction from a record even when the pitch thereof differs slightly from that of the feed-screw of the machine. The pitch of the feed-screw of the machine on which the original record is made will differ from the pitch of the feed-screw of the machine on which the resulting duplicates are to be used to an extent depending upon the coefficient of contraction of the material used, and will be determined by experiment with the material employed."



The standard pitch of the feed-screw of all reproducing machines of the phonograph type is 100 threads per inch, which standard was originally adopted by Mr. Edison and is still used. In practice the special recording machines referred to in the patent in suit on which the original records are made are provided with feed-screws having a pitch of  $98\frac{2}{3}$  threads per inch, but, as Mr. Edison says in the patent in suit, this pitch will depend somewhat upon the special materials employed and will be determined by experiment.

The claims as to which infringement by the defendant is asserted are as follows:

"1. The process of duplicating cylindrical phonographic records, which consists in first making an original record with a spiral record-groove of greater pitch than that desired on the duplicate to be produced, then in making a hollow cylindrical matrix or mold from said original record, carrying the record in negative on its bore, and in finally making duplicate records from the matrix or mold by introducing therein and engaging therewith material maintained in an abnormally high temperature, whereby the cooling of such duplicate will contract the pitch of the record-groove, as and for the purposes set forth."

"2. The process of duplicating phonographic records, which consists in securing a mold containing the record in negative on its bore, in introducing a molten material in the mold to receive a surface impression from such record, in allowing the molten material to set, in contracting the set material, and in separating the contracted molded material by a longitudinal movement, substantially as set forth."

"4. The process of duplicating cylindrical phonograph records, which consists in forming a cylindrical mold with a record in negative on its bore, in introducing a molten material in the mold to form a cylindrical duplicate, in allowing the duplicate to set, in contracting the duplicate, and

in removing the contracted duplicate by a direct longitudinal movement, substantially as set forth."

"5. The process of duplicating cylindrical phonograph records, which consists in forming a cylindrical mold having the record in negative on its bore, in introducing a molten material in the mold around a core, whereby a hollow cylindrical duplicate will be formed, in allowing the molten material to set, in contracting the molten material, and in withdrawing the contracted material from the mold by a direct longitudinal movement, substantially as set forth."

Complainant's expert says, regarding these claims : <sup>1</sup>

"The first claim covers broadly the production of duplicate phonograph records having a record groove of the standard pitch, namely 100 per inch, by first producing an original record having a *pitch somewhat coarser than that standard*, then in making a mold or matrix therefrom, and finally in engaging with the record surface of the latter an impressionable material at a temperature higher than that of the atmosphere, so that when the material cools its *longitudinal* contraction will effect a *reduction in the pitch* of the record groove to the desired standard.

This claim is not specifically limited to a casting process in which this special expedient is utilized, but is broad enough to include any process in which the engagement is effected between a mold and an impressionable material 'maintained in an abnormally high temperature,' such, for example, as a process like that of Mr. Edison's patent No. 713,209, wherein a blank is heated so as to expand into engagement with the mold.

The second claim covers a process of duplicating phonograph records from a suitable mold by

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<sup>1</sup> 1 C. R., 1076, p. 171.



first introducing a *molten* material into the mold to receive a surface impression therefrom; then in permitting the material to *set*; then in *contracting* the set material *diametrically* so as to clear the engaging surfaces, and finally in removing the resulting duplicate by a direct longitudinal movement.

The fourth claim covers substantially the same process as the second claim, except that it is specifically limited to the manufacture of cylindrical duplicates. Consequently the second claim would be broad enough to include a process of making, not only cylindrical duplicates, but duplicates of other forms from an annular mold.

The fifth claim covers substantially the process of the fourth claim, except that it is specifically limited to the introduction of the molten material around a core so as to form a relatively finished bore therefor."

#### CASE 1076—DEFENSE OF ANTICIPATION AND LACK OF INVENTION.

Claims 2, 4 and 5 will be first considered in this connection, because these claims are more closely allied, than claim 1, with claims 2 and 3 of the patent in suit in case 1103 which have already been discussed.

#### Alleged Anticipations of Claims 2, 4 and 5.

The argument of defendant's expert is that these claims are anticipated by Edison's split mold patent of 1892, and by the practice and patents relating to the manufacture of phonograph blanks. We have already discussed these features of the prior art in connection with the broader Edison patent, and have shown that they do not anticipate Edison's broad invention. It follows therefore that they do not anticipate the invention of the patent in this suit, which covers a specific way of carrying out the broad invention of the Edison

patent in the other suit. It is desirable, however, to call attention to the discussion of these matters in the record of the present case.

### **Case 1076—Edison's Split Mold Patent.**

The argument of defendant's expert regarding the anticipation of claims 2, 4 and 5 by the Edison split mold patent of 1892 is based upon the erroneous assumption that anyone attempting to carry out the process of that patent would inevitably find that the duplicate contracted away from the mold, because, as defendant's expert thought at the time, the setting or hardening of the material was accompanied by its diametric contraction. Complainant's expert corrected this error and showed that in casting duplicates in a mold two distinct and separate phenomena are present, and that a considerable further reduction in temperature is required after the material sets before it contracts away from the surface of the mold.<sup>1</sup> Mr. Aylsworth demonstrated experimentally that under different conditions the contraction necessary to clear the surfaces of the mold and duplicate takes place only after a lapse of time, varying between 10 minutes and 38 minutes, after the material has set sufficiently to stand up and hold its shape.<sup>2</sup> And Mr. Edison says that the lapse of time is considerable between the setting of the composition and its bodily contraction away from the surface of the mold, and that there is an expansion rather than a contraction of the material at the time of setting.<sup>3</sup> Consequently anyone attempting to practice the split mold process could open the mold and release the duplicate at any time during a period of from 10 to 38 minutes after the material had set without finding

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<sup>1</sup> C. R., 1076, p. 173.

<sup>2</sup> C. R., 1076, p. 265.

<sup>3</sup> C. R., 1076, p. 269.



that it had contracted away from the surface of the mold. Edison's split mold patent, therefore, does not suggest the manufacture of duplicates by casting in a continuous mold, or the removal of the duplicates from such a mold by contracting them diametrically and withdrawing them longitudinally, all of which features are elements of claims 2, 4 and 5 of the patent in suit. Nor would ordinary practice or attempted practice with it necessarily reveal the fact that the material would shrink diametrically in such a manner as to clear the record.

Further than this, the split mold patent describes an inoperative process, in that it would result in the production of a useless duplicate having fins or burs formed where the sections of the mold join.<sup>1</sup> The process of the split mold patent is also inoperative because it does not provide a casting process which could be successfully carried out. The pouring of the molten material into the mold would result in the aeration of the material or the entrapping of air, which would destroy the operative character of the record surface.<sup>2</sup> As complainant's expert says:<sup>3</sup>

"To make a casting process operative, the material at the instant the impression is taken must be in a limpid, non-aerated condition, which can be done either by introducing the limpid material from the bottom upwards, as disclosed in the patent in suit, so that air never enters it, or by maintaining it in a limpid condition while in the mold until the air has had the opportunity of escaping."

That a duplicate phonograph record cannot be cast by pouring the molten material into a mold and allowing it to cool is asserted by defendant's principal fact witness, Macdonald.<sup>4</sup>

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<sup>1</sup> C. R., 1076, fols. 724-5.

<sup>2</sup> C. R., 1076, fol. 732.

<sup>3</sup> C. R., 1076, fol. 733.

<sup>4</sup> D. R., 1076, p. 72.

Further, the split mold patent does not anticipate claims 2, 4 and 5 of the patent in suit, because those claims are based upon the discovery that only by the employment of certain materials, namely, those of the type of metallic soap compositions, can a successful result be attained. Not only are such materials not described in the split-mold patent, but they had not been introduced into this art at the date of the application for that patent.

**Case 1076—Practice and Patents Relating to the Manufacture of Phonograph Blanks.**

The argument of defendant's expert upon the practice and patents relating to the manufacture of phonograph blanks is also based upon a mistake of fact, as to which he was subsequently corrected by complainant's witnesses. He assumed that in the manufacture of phonograph blanks the material was cast in a mold and was contracted by cooling until the blanks "rattled around" in the mold. The testimony regarding the practice in the manufacture of phonograph blanks has already been referred to (*supra*, p. 35); that given by Mr. Aylsworth will be found in the present record at pages 118 to 121, and that given by Mr. Edison will be found at pages 145-6, while the testimony given by Mr. Pierman as to the practice in defendant's factory will be found at page 107.

The practice and patents relating to blank manufacture are considered by complainant's expert in the present case.<sup>1</sup> He states his conclusions in the following language :

"Of course I do not pretend to say that it was not a matter of common knowledge of most persons that a waxlike material would contract in

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<sup>1</sup> C. R., 1076, pp. 185-188.



bulk when subjected to a reduction in temperature, but I do maintain that the possibility of securing a diametric contraction of a molded duplicate sufficiently to entirely clear the surfaces and permit the withdrawal of the article without injury to the record surface was something that could not be predicated on any other art of which I have knowledge, and certainly not on the art of making phonograph blanks. And I also assert that no known art, and certainly not the art of making phonograph blanks, offers any suggestion of the possibility of making, in a continuous mold, a completely finished waxlike article comparable at all with a duplicate phonograph record, whose surface must be absolutely perfect in every detail and would be destroyed commercially by a single minute scratch or a single air bubble or a single distortion due to the sticking of the material to the mold."

**Case 1076—Invention of Claims 2, 4 and 5  
in View of Edison's Broad Patent  
713,209.**

We assume that the arguments which have before been referred to under the heading "Defense of Double Patenting" (*supra*, p. 66), will, when given their proper legal direction, involve the question as to whether there was any invention in the casting process covered by claims 2, 4 and 5 of the patent in suit over the expanding process described in Edison's patent 713,209, especially in view of the fact that Edison had already suggested a casting process by his split mold patent of 1892.

It appears from the testimony of Mr. Aylsworth<sup>1</sup> and Mr. Edison<sup>2</sup> that the casting process is cheaper

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<sup>1</sup> C. R., 1076, fols. 1061-3.

<sup>2</sup> C. R., 1076, fol. 1075.



than the expanding process and produces superior results, and defendant's expert takes the same view (D. R., 1103, p. 123). It should also be borne in mind that protracted experiments were necessary to reach success with a molten-material casting process, even after Mr. Edison had perfected the expanding process with merely softened or plastic material (*supra*, p. 17). Further, it should be remembered that the invention of the patent in suit is based upon the discovery that certain materials are required to enable a casting process to be successfully performed, and also that the casting process must be one in which the molten material is manipulated so as to be in a non-aerated condition and without entrapped air bubbles at the time the cast is taken. Neither this discovery nor this necessary manner of manipulation is suggested by patent 713,209, and we do not see that the argument is aided by including in the consideration the fact that Mr. Edison had suggested a casting process in his split mold patent of 1892, because that patent describes an inoperative casting process and one which even if it could be operated would result in a useless product.

Even although it was previously known to Mr. Edison (although not to the world) that blanks rendered plastic by heat and expended after insertion in a mold would, by cooling, shrink back again so as to clear the surfaces, yet that did not necessarily involve the further discovery that a *molten* material in liquid form—and therefore much more apt to stick to the mold and much less apt to have internal tenacity, so as to cling together or adhere molecularly when cooling—could be utilized so as to take an impression from the microscopic pattern on the interior surface of the mold and then pull itself out of that pattern without impairment and contract radially so as to clear the mold. Such a discovery clearly was one which could only have been arrived at by experiment, and that of a patent kind.



**Case 1076—Alleged Anticipation of  
Claim 1.**

Defendant's expert argues that claim 1 covers the making of a duplicate of finer pitch of record groove than the master record from which the mold is made, and hence that the invention is anticipated by Edison's split mold patent of 1892, because, due to the contraction of the duplicate which would necessarily take place in practicing the process of that patent, the duplicate would have a finer pitch to the record groove than the master. In making this argument, however, defendant's expert fails to understand the invention covered by claim 1. His reasoning starts at the wrong end, the claim *not* being directed to *making a duplicate* of finer pitch than the master, but to a process which *results in a duplicate of standard pitch*, by *making and utilizing* a MASTER which varied from the standard form or pitch in a manner which rendered it wholly useless except in that special process. To conceive of this method of manufacture of commercial duplicates clearly involved a radical departure from what had been done before, which departure had not occurred to any of the experimenters who had been endeavoring to cast duplicates by the use of plastic material which shrank in cooling.

Complainant's expert says: <sup>1</sup>

" Mr. Cameron reaches this conclusion by an incorrect interpretation of the first claim as covering all processes for making duplicates with a finer pitch of record groove than the masters. This is not the case, as I have before said. The claim relates solely to the manufacture of a definite product, and is realized only when a definite procedure is followed. It is of course true that with the process of the split mold patent the duplicates

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<sup>1</sup> C. R., 1076, p. 184.

will have a finer pitch of record groove than the original masters, but there is nothing in the prior patent that throws any light whatever on the special problem with which Mr. Edison is here dealing. Apparently with the split mold patent the original records were of the normal kind, and hence were of standard pitch. Certainly nothing appears in that patent to indicate that the original records were of an abnormal character. Consequently the resulting duplicates would not be of the standard pitch, and hence could be used on commercial reproducing apparatus only by a constant adjustment of the stylus, as I understand was actually done in practice. Simple as Mr. Edison's invention may appear now to be, it was not an obvious thing, in my opinion, owing to the microscopic character of the records and the impossibility of observing with the eye the effect on the record groove of longitudinal contraction. No one could determine by inspection that one record was of a pitch of 99 threads per inch and another record of a pitch of 100 threads per inch, and that could only be done microscopically by elaborate apparatus. It required invention to reason out the difficulties with duplicates made from normal masters, and it required invention to correct those difficulties by the use of masters of an abnormal character. It seems to me that the obvious thing for a person to do would be to take the ordinary standard record and to make duplicates therefrom, and if after having obtained such duplicates he found that they could not be satisfactorily reproduced in a commercial phonograph, the natural thing, in my opinion, would be to modify the reproducing apparatus to accommodate the vagaries of such a record, as, for example, by allowing a considerable lost motion or side play on the part of the stylus, rather than to attempt to make an entirely new variety of duplicate in a new way to meet the limitations of the phonograph itself."



The matter is again discussed by complainant's expert,<sup>1</sup> who calls attention to the fact that the Edison application, when pending in the Patent Office, was rejected by the Examiner, who made substantially the same arguments against the patentability of the claim that are now made by defendant's expert. The claim was allowed by the Board of Examiners-in-Chief on appeal, whose decision is in evidence.<sup>2</sup> Complainant's expert was exhaustively cross-examined on the subject of the invention of the first claim,<sup>3</sup> with the result of strengthening complainant's position. Among other effective statements made by him is the following:<sup>4</sup>

"Of course, these considerations are more or less speculative, but I should say, assuming the process of the first claim to be unknown and the condition of the art to be as it was before that invention was made, that if a person made a duplicate record from the master formed on a standard recording machine and found that it could not satisfactorily be reproduced, he would attribute the failure to a defect in the machine, such as its incapacity to feed properly, or the jumping out of the reproducer ball under the effect of vibrations. The records are so minute and obscure that no one could see by the eye what the true situation was, and could only determine that microscopically by elaborate and delicate apparatus, and then only when the trouble was suspected. It would require the inward eye of the imagination to reason out the difference in pitch between the duplicate record and the master from which it was made. Assuming that this discovery had been made, then, in my opinion, the obvious way of getting around the difficulty would be to modify the re-

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<sup>1</sup> C. R., 1076, fols. 756-9.

<sup>2</sup> C. R., 1076, pp. 368-9.

<sup>3</sup> C. R., 1076, pp. 210-223.

<sup>4</sup> C. R., 1076, fols. 859-63.

producing apparatus so as to permit a sufficient side-play of the ball to keep in and track the groove. You are correct, I think, in assuming that the reproducing machine could be modified so that its feed screw should correspond with the pitch of the duplicate record, but I cannot say that that would be an obvious thing, and it would certainly be an impracticable thing, because when the molded duplicates were put on the market thousands of talking machines of standard pitch had been sold and were in use, and hundreds of thousands, perhaps millions, of records were in use, so that the putting out of a machine with a new standard would have simply disorganized the business. The making of the invention of the first claim solved the difficulty, and that invention was made, first, as a result of the discovery that molded duplicate records were of a different pitch than the masters, which discovery would be made, not by observation, but as a result of reason; and second, as a result of the inventive faculty in determining that a desired product could be secured by operations performed in an abnormal manner."

Mr. Edison's testimony upon the invention of the first claim of this patent is also illuminative. He testified : \*

"69 Q. Was there anything in the nature of the subject or in the development of the experiments which made this invention [that of claim 1 of patent 667,662] not obvious in view of the ordinary casting practice?

"A. Yes. Every compound, at least most compounds, used in phonograph work for making blanks and cylinders have different properties, are accompanied by different phenomena; some attack

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\* C. R., 1076. p. 150.



the mold violently, some contract out of round, some stick to the mold, some actually expand when they ought to contract, and there is no possible way to know how one of those mixed compounds is going to work under any condition until you have tried the experiment; the melting points vary, and they vary in all possible ways. The melting point of a simple substance is constant; the melting point of a compound substance varies in every conceivable way. A great many cylinders when they solidify actually expand, because some solidify in the amorphous state and even after they are nearly cold will turn and become crystalline and actually expand. Some materials in a mold have to be chilled down below the freezing point before they can be got out. There are some materials that stay viscous a long while, and when they are on a polished surface they are apparently held there by the atmospheric pressure of 15 pounds to the inch up to a certain point, and then they suddenly contract with a snap. Others don't do this. In fact, it is a very long, tedious problem, in experimenting with these materials, to obtain what is desired."

The statements made in this answer by Mr. Edison are fully confirmed by the translation of Schulze-Berge's note-book which appears in evidence.<sup>1</sup> It will be seen by examining these notes that great difficulty was experienced in reaching the result of securing a duplicate of standard pitch, and that all of the troubles referred to by Mr. Edison as well as many others were experienced. Under date of July 25, 1890<sup>2</sup> Schulze-Berge notes "First mold with wide thread," which Aylsworth says<sup>3</sup> means "a mold made from a record made on a phonograph having a coarser pitch thread than the standard in accordance with his previ-

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<sup>1</sup> C. R. 1076, pp. 277-311.

<sup>2</sup> C. R. 1076, p. 289.

<sup>3</sup> C. R. 1076, p. 123.



ous experiments." But even after his elaborate experiments and calculations which formed the basis for the construction of this mold, it did not give satisfactory results, because Schulze-Berge notes in the record of duplicates obtained from this mold and other wide-thread molds (records of which appear following the entry of July 25, 1890), variations in shrinkage, some of the duplicates being "short" and others being "long." A careful study of the Schulze-Berge notes shows that the problem of making a standard pitch duplicate was not one which could be solved off-hand, but required protracted and painstaking experiment. The statement of complainant's expert that the difficulty which was finally solved by making a coarser pitch master was one which was not in itself obvious, finds support in the following testimony given by Mr. Edison :<sup>1</sup>

" 70 Q. At the time you made this invention covered by claim 1 of patent 667,662, the time you made the invention of the coarser pitch master, was there anything in the nature of the waxes used which prevented you from readily seeing what the result was in the resulting record?

" A. Why, you couldn't see it, but you could tell there was something wrong when you tried to reproduce it, but as there were several things wrong at the same time, it was pretty difficult to differentiate.

" 71 Q. Were you able at that time to work with a microscope on your records?

" A. We had a microscope, but we had no apparatus rigged up whereby we could get any good results or study the records like we have now, and we did most of our experimenting on records that were not dark enough to reflect the light sufficiently to show the contour of cavities which were only half a thousandth of an inch deep or there-

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<sup>1</sup> C. R., 1076, pp. 150, 151.



abouts, and we had to work entirely by our brain—theorize. In later years of course we had microscopes, and we had them rigged up in machines whereby the proper reflection of light was obtained, the proper objective, and with the dark colored record we are able to study the contour of the records, and can tell under the microscope what is the matter with the record; but in those days we hadn't these facilities, and a great many experiments were tried on white records, and even to-day, with all our apparatus made specially for the purpose, it is very difficult, with the microscope, to tell very much about the white records without the cut is very shiny so as to reflect light."

The validity of claim 1 can be supported because invention was exercised in making the discovery of the difficulty to be overcome and in providing a definite remedy, and it can also be sustained because even after the difficulty was discovered, it was not obvious whether it should be remedied by a change in the process of producing the duplicate, or by a change in the lateral play of the reproducer, or in some other way. Complainant's expert thinks the obvious way to solve the difficulty was to change the reproducer. Inventive talent was exercised in determining that one rather than another way of solving the difficulty was the proper way.

Even if it could be regarded that up to this point in the development of the invention no act of invention had been exercised, we should say that the difficulties experienced in reducing to practical realization this selected solution of the problem, as shown by Mr. Edison's testimony and by Schulze-Berge's notes, would take the invention outside of the realm of obviousness and outside of the expected skill of the artisan in this branch of work. The simplicity of the invention, now that Edison has shown the way, and the completeness with which it solves the difficulty, are evidence of invention



of the highest order rather than of an obvious way of overcoming an obvious difficulty.

Invention may reside in finding out what is needed, even though the accomplishment of the result after that point is reached is simple and possibly obvious.

*The Barbed Wire Patent*, 143 U. S., 283.

*Gandy vs. Belting Co.*, 143 U. S., 594.

*Cremenz vs. Cottle Co.*, 148 U. S., 560.

*Potts vs. Creager*, 155 U. S., 609.

*DuBois vs. Kirk*, 158 U. S., 63.

*Edison Elec. Light Co. vs. Electric Engineering Co.*, 66 F. R., 309.

In the last case, Judge LACOMBE, speaking for the Circuit Court of Appeals for this Circuit, said:

"It needed, however, no prior patent to instruct anyone that if a screwthreaded plug with a projection on the end is screwed into a hole, there will be compression of material between the screwthread and the end of the plug as soon as the latter impinges on the bottom of the hole. The merit of Bergmann's invention consisted, not in showing to the world that if you had a screwthread on a lamp base and a metal plate at the end of the base with insulating material between screwthread and plate, you would secure the compression of such insulating material when you screwed it into a socket till it touched bottom; but *in finding out that the cracking and disintegration of the plaster of Paris bases of the older lamps was occasioned by tensile strain between the terminals*, and that this particular difficulty could be overcome and the lamp's service improved by reversing the position of the terminals in both lamp and socket, so that the strain should be no longer tensile but compressive."

In addition to Edison's split mold patent of 1892, defendant's expert has put into the record some statements with regard to the "shrinkage rule," by which it appears that in the art of casting metals the patterns



are made somewhat larger than the finished articles to allow for shrinkage in casting, and that rules are constructed for use by pattern-makers in making patterns which have the graduation somewhat larger than actual measurement (differing with the kind of metal of which the article is to be made) so that the pattern-maker in making up a pattern with this shrinkage rule will produce one which has the necessary enlargement. But we do not see that this deprives claim 1 of the patent in suit of the quality of invention in view of the facts to which attention has already been called. Mr. Edison was asked if he regarded the invention of claim 1 as obvious "in view of the general practice in the art of casting metals where the mold is made larger than the intended size of the article cast in it." His answer<sup>1</sup> puts the matter in a nut-shell :

"Well that's generally said of every new invention ; but obviousness only comes after ; it's post-mental. What I mean by this is that if there is—the history of invention shows that if there is a certain thing wanted and many thousand patents are taken out and yet none of the things wanted are produced and sold, and there comes along an inventor who does some little thing to one of these many thousand patents on the same thing, and it becomes at once of universal use, that little thing is generally what is called 'obvious.' Every inventor knows that there are very few of the obvious things that work ; it is the ones that were not obvious that work."

Defendant's counsel may seek to gain comfort from the statement made by Miller<sup>2</sup> that both he and Aylsworth knew a special thread for the master was necessary, "as when the duplicates which were made on the regular mandrel were placed upon a phonograph, the

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<sup>1</sup> C. R., 1076, fol. 595.

<sup>2</sup> C. R., 1076, fol. 383.



reproducer would not follow the record accurately across its entire length." But this was *knowledge derived from Edison's work*, with which both Miller and Aylsworth were acquainted, as appears at a number of points in the record.<sup>1</sup> Aylsworth's testimony on this point is explicit.

"We knew that it was necessary to have a mold of a coarser pitch than the standard pitch of 100 threads to the inch, *because Mr. Wurth made his molds with a coarser pitch.*"<sup>3</sup>

#### CASE 1076—INFRINGEMENT.

In asserting that the defendant's process does not infringe claims 1, 2, 4 and 5 of the patent in suit, defendant's expert seeks to place two limitations upon these claims, for which there is absolutely no warrant. The first of these limitations is that the claims are limited to the making of a mold by a process of vacuous deposit. The asserted basis for this limitation is that the patent in suit states that the invention is an improvement upon the process of the split mold patent of 1892, and the split mold patent being limited to the obtaining of the mold by a process of vacuous deposit, defendant's expert argues that the patent in suit is likewise so limited. But in making this argument he overlooks the fact, to which complainant's expert calls attention,<sup>2</sup> that the patent in suit refers to the application upon which patent 713,209 was granted for the description of how the mold should be made, and that patent describes not only the use of the vacuous deposit for obtaining the conducting coating on the original or master record, but also the exact process used by the defendant, namely, the employment of a preliminary coating of graphite.

Another limitation which defendant's expert seeks

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<sup>1</sup> C. R., 1076, fols. 340, 380, 464.

<sup>2</sup> C. R., 1076, fols. 709-10 and 808.

<sup>3</sup> C. R., 1076, fol. 468.



to put upon the claims of the patent in suit is that they are limited, either directly or by necessary implication, to the use of a mold which is cold when the molten material is introduced into it. This assertion, which defendant's expert makes with regard to all of the claims, is entirely unwarranted,<sup>1</sup> and it is equally clear that no such limitation of claims 2, 4 and 5, to which defendant's expert makes a special application of this proposed limitation, is intended by the patent or necessary to their proper interpretation.<sup>2</sup>

The only other suggestion made by defendant's expert on the question of infringement which is worthy of attention—and this, we understand, he applies to all the claims in issue—is that defendant's process is radically different from the process set out in the patent in suit, because the defendant *superheats* the molten material after it is introduced into the mold. The basis for the argument that this makes defendant's process radically different from the process of the patent in suit is that (according to defendant's expert) the defendant thereby secures a perfect result, whereas with the process of the patent in suit a perfect or successful result could not be accomplished. The purpose of superheating the molten material after it is introduced into the mold in defendant's process is to drive out the air bubbles and secure a non-aerated condition of the material before it sets<sup>3</sup>—a condition which is secured in the process of the patent in suit by introducing the molten material into the bottom of the mold.

There is no foundation in the record for the view of defendant's expert that the process of the patent in suit is not fully operative to secure a commercial result. His statement is probably based upon the testimony of defendant's witness, Macdonald,<sup>4</sup> to the effect that successful results cannot be obtained by *pouring* melted

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<sup>1</sup> C. R., 1076, fols. 812, 813.

<sup>2</sup> C. R. 1076, p. 201.

<sup>3</sup> D. R. 1076, p. 71.

<sup>4</sup> D. R. 1076, p. 72.



wax into a mold. Complainant's witnesses agree entirely with this view expressed by Mr. Macdonald, but in assuming that a similar lack of success would follow the carrying out of the process described in the patent in suit, defendant's expert overlooked the fact that in that process the wax is not poured into the mold, but is introduced into the mold at the bottom and rises upwardly therein. To prove the entire operativeness of the process of the patent in suit carried out with the precise apparatus therein described, manipulated in the manner set forth in the specification, complainant's witness Aylsworth built an apparatus of that kind and carried out the precise process of the patent in suit with entire success,<sup>1</sup> and complainant's expert, although without experience or manipulative skill, found no difficulty in carrying out the process of the patent in suit with this apparatus, with results which were entirely successful and commercial from the very start.<sup>2</sup> He says: <sup>3</sup>

"From my work with the patented invention, I do not hesitate to say that the patent in suit describes a process which is capable of being carried into effect for the production of commercially perfect articles even by persons having no special skill in this art. It is also clear to my mind, from the experiments which I made, that when the molten material is introduced in the mold from the bottom upwards, as with the preferred method of the patent in suit, heating of the mold is entirely unnecessary and might be detrimental."

No testimony is presented by the defendant to the contrary effect, and therefore it must be taken as established that the process of the patent in suit is a commercially operative process. There is, evidently, no foundation for the argument of defendant's expert

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<sup>1</sup> C. R., 1076, pp. 126, 127.

<sup>2</sup> C. R., 1076, pp. 179, 180.

<sup>3</sup> C. R., 1076, fol. 720.



that the superheating of the wax in defendant's process makes that process radically different from the process of the patent in suit, because it makes the defendant's process a commercial one, while the process of the patent in suit, due to the absence of this step, is an uncommercial one. Complainant's expert compares the defendant's process with the process of the patent in suit with the following result: <sup>1</sup>

"The similarity between the two processes can be best understood by a comparison of the corresponding steps performed by each.

(1) With the Macdonald process, as well as with that of the patent in suit, the master record is first made in a recording machine having an abnormally coarse-pitch feed-screw.

(2) With the Macdonald process, as well as that of the patent in suit, the master record so obtained is first covered with a very thin coating of a conducting material.

(3) With each process the master so prepared is then electroplated with copper.

(4) With each process the copper matrix obtained in this way is fitted with a receiving jacket or shell.

(5) With each process the original master record is then removed, leaving a continuous cylindrical mold with the record in relief on its bore.

(6) With each process the matrix or mold is provided with a goldplated bore to resist oxidation.

(7) With each process a molten waxlike material is introduced into the mold around a suitable core.

(8) With each process the waxlike material is then allowed to set so as to become solid and take an impression from the mold.

(9) With each process the set material is then contracted diametrically so as to clear the engaging surfaces.

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<sup>1</sup> C. R., 1076, pp. 195-6.



(10) With each process the cooling of the cast duplicate results in a longitudinal contraction, reducing the pitch of the record groove to the standard pitch.

(11) With each process the contracted duplicate is withdrawn longitudinally from the mold.

(12) With each process the duplicate is then finished by reaming its interior and properly dressing its ends.

In other words, in every essential respect each step of the process of the patent in suit finds its counterpart in the Macdonald process. It would be difficult, in fact, to conceive of two processes more closely connected than the two between which I have thus instituted a comparison."

Regarding the only substantial difference between the two processes, namely, the superheating of the wax in one and the introduction of the wax into the bottom of the mold in the other, complainant's expert says:\*

"I find only one difference between the two processes, and that I regard as being unimportant, since, in my opinion, one is the equivalent of the other. This difference has reference to the manner in which the molten material is manipulated, so that, at the instant the impression is taken, it will be in a limpid and non-aerated condition. With the preferred embodiment of Edison's process described in the patent in suit, the molten material is introduced into the mold from the bottom upwards, so that air is always excluded therefrom. With the Macdonald process, the material is introduced into the mold from the top, and, therefore, in order to permit the air to escape, the molten material is maintained in a limpid condition for some time after its introduction. In each case, however, the special step followed has

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\* C. R., 1076, pp. 196, 197.



the same object in view, and one is, in my opinion, the equivalent of the other. I regard, however, Edison's expedient of introducing the material into the mold from the bottom upwards to be preferable to the expedient suggested by Macdonald, for the reason that the process is facilitated, since the cooling of the material commences from the instant of its introduction into the mold."

**SUMMARY.**

The three known processes of molding phonograph records had their inception with Mr. Edison, and were perfected by him and his company, the complainant. The success of those processes depends upon the formation of the duplicate in a hollow cylindrical mold with continuous or unbroken walls, because it is only on such a continuous and unbroken surface that a perfect copy of the record can be produced. The use of the continuous mold was made possible, primarily, by the invention of removing the duplicate from the mold by a diametric contraction of the duplicate sufficient to entirely clear the engaging surfaces and permit of its direct longitudinal withdrawal from the mold. That was an epoch-making invention, and resulted in the production of a new commercial art which has already proved of great importance, and is destined to have an ever-widening influence on the larger art of recording sounds. That invention is covered by claims 2 and 3 of the Edison Patent 713,209. The novelty and patentable character of the invention presents no serious difficulties. The patent is clearly expressed, and the proper interpretation of the claims is free from doubt. That the defendant employs that invention is also clear, because its operations are directly within the terms of the claims, and because of the wide range of equivalents covered by patents of this pioneer character.

The casting process of Patent 667,662 is an improvement upon the broad invention of Patent 713,209—patentably different therefrom and yet utilizing it as an essential feature. That process is clearly stated in claims 2, 4 and 5. That the casting process of Patent 667,662 has the characteristics which confer patentability over the expanding process specifically described in Edison's broad Patent 713,209 is apparently agreed to by the experts for both parties. The novelty and patentability of that process over the other items of the prior art would also seem to be without doubt.



The interpretation of the patent presents no difficulties, and the limitations which defendant's expert seeks to import are not made necessary by its language or by the prior art. The infringement of the claims is also clear, the single departure of defendant from the precise casting process described by the Edison Patent being in an immaterial particular and involving an equivalent function. The views of defendant's expert upon the materiality of that difference in detail were based upon an erroneous assumption as to the degree of success which could be secured by carrying out the process precisely as described in the Edison Patent—an assumption the error of which was subsequently abundantly shown by proof.

Claim 1 of Patent 667,662, covering the process by which duplicates of a standard pitch are made, involves an inventive idea not disclosed by the prior art and unquestionably used by defendant. That the result was new with Mr. Edison is not seriously disputed; that it was an important and valuable result is without doubt. Defendant's position rests wholly upon the denial that "invention" was required to produce the result. We believe that a consideration of the facts bearing upon this question and of the authorities, referred to earlier in this brief, will lead to a conclusion favorable to the complainant.

#### CONCLUSION.

We ask for the usual decree for an injunction and accounting against the defendant on claims 2 and 3 of Patent 713,209 and on claims 1, 2, 4 and 5 of Patent 667,662.

FREDERIC H. BETTS,  
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Of Counsel for Complainant.

New York, June, 1904.

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